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CYTOLOGY OF HELMINTHS

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CYTOLOGY OF HELMINTHS.

2582 ALLEN, A. R.; FULLMER, C. D. Primary diagnosis of pulmonary echinococcosis by the cytologic technique. *Acta Cytologica* (1972) 16 (3) 212-216 [En] Dept. of Pathology, Holy Cross Hospital, Salt Lake City, Utah 84102, USA.

A case of pulmonary hydatid in man is reported, in which definitive diagnosis was established by cytologic examination of sputum smear. The structural features of *Echinococcus granulosus* and non-cellular appendages are presented, and the usefulness of cytologic examination in their detection is emphasized. RTKW

254—Journal of Parasitology.

(xv) G. C. Godman & C. H. Willey "Notes on embryonating eggs of *Zygocotyle lunata* and on their preparation for cytological study"; (xvi) R. F. Nigrelli "Parasites of the green turtle, *Chelonia mydas* (L.), with special reference to the rediscovery of trematodes described by Looss from this host species";

m. AMERICAN SOCIETY OF PARASITOLOGISTS, 1941.—"Program and abstracts of the seventeenth Annual Meeting of the American Society of Parasitologists, Dallas, Texas, December 29, 30 and 31, 1941." 27 (6), Supplement, 44 pp.

425—Anatomical Record.

a. AMERICAN SOCIETY OF ZOÖLOGISTS, 1936.—"Program for the thirty-fourth annual meeting." 67, Supplement No. 1, pp. 11-136.

(425a) The programme contains a list of numbered titles and abstracts of which the following are of helminthic interest: (i) B. D. Reynolds "Adolescariae from *Agriolimax agrestis*" (No. 107); (ii) C. H. Willey "Cytology and development of flame cells in the redial generation of a trematode" (No. 131); (iii) G. W. Hunter III & H. C. Dalton "Studies on *Clinostomum*. V. The cyst of the yellow grub of fish (*C. marginatum*)" (No. 138); (iv) A. C. Walton "The larval form of *Foleyella americana* Walton, 1929" (No. 139); (v) H. W. Beams & R. L. King "Ultracentrifuging and the first cleavage plane in *Ascaris suum*" (No. 193); (vi) G. W. Hunter III & W. S. Hunter "Studies on host reactions to larval parasites. I. Effect on weight" (No. 228); (vii) J. E. Ackert, I. Pratt & A. E. Freeman, jr. "Resistant and susceptible groups of white leghorn chickens to the nematode *Ascaridia lineata* (Schneider)" (No. 229). B.G.P.

2081—ANDERSON, R. C., 1960. [Department of Parasitology, Ontario Research Foundation, Toronto 5, Ontario, Canada.] "The origin of the protuberance on the inner surface of the egg capsule of *Cystidicola cristivomeri*." Canadian Journal of Zoology, 38 (2), 257-260.

Anderson has studied the origin of the small protuberance on the inner surface of the egg capsule of *Cystidicola cristivomeri* (Nematoda) and has established that it is the first polar body. W. G. Inglis

1233—ANYA, A. O. & LEE, D. L., 1967. "Observations on the structure and development of the spermatozoa of *Aspiculuris tetraptera*." [Abstract.] Parasitology, 57 (4), 7P.

592—Mikrokosmos.

a. AUER, A., 1938.—"Entwicklung der männlichen Geschlechtszellen von *Ascaris megaloccephala*." 32 (3), 45-50.

378—BADARANY, N., 1961. "Organisation ultra-microscopique de la membrane nucléaire de la spermatide de la sangsue (*Hirudo medicinalis*)."
Comptes Rendus des Séances de l'Académie des Sciences. Paris, 253 (9), 1127-1129.
Studies on the nuclear membrane of the spermatids of *Hirudo medicinalis* are briefly reported with reference to 8 electronmicrographs. H.H.W.

2832—BAIN, O., 1969. "Morphologie des stades larvaires d'*Onchocerca volvulus* chez *Simulium damnosum* et redescription de la microfilarie."
Annls Parasit. hum. comp., 44 (1), 69-81. [English summary p. 69.]

Bain gives a detailed description of the microfilaria of *Onchocerca volvulus* and describes its development in *Simulium damnosum* kept at 25 to 27°C. The R₁ cell is rather far posterior (66.6 to 70.2% of the total body length) in *O. volvulus*. The infective larva varies from 600 to 825 μ in length. The various developmental stages can be recognized by the form and length of the tail. The author discusses the origin of the somatic muscles and the hypodermis and suggests they may be derived from different kinds of cells lining the cuticle of the microfilaria. The R₂₋₄ cells apparently form the rectum; the R₁ cell does not participate in the formation of this part of the alimentary canal. R.C.A.

2984—BAIN, O., 1970. "La cellule R₁ des micro-filaires (Nematoda), initiale du mésenchyme."
Annls Parasit. hum. comp., 45 (2), 227-235. [English summary p. 227.]

The origin of the organs of *Setaria papillosa* microfilariae during the first hours of development in *Aedes aegypti* was investigated. The R₂₋₄ cells are involved in the production of the rectum. The R₁ cell gives rise to the musculature of the adult. The worm intestine is formed by 5 initial cells which become apparent from the early stages of development; the oesophagus develops around a cuticular axis extending from the apical end to the region of the most anterior intestinal nucleus. Similar studies on the microfilariae of *Wuchereria bancrofti*, *Foleyella candezii* and *F. furcata* are reported in less detail. M.R.N.S.

2699—BARABASHOVA, V. N., 1968. [The distribution of DNA and RNA in nuclei of integument of some acanthocephalans.] *Parazitologiya*, 2 (1), 56-60. [In Russian: English summary p. 60.]

The distribution of DNA and RNA in nuclei of the integument in *Macracanthorhynchus hirudinaceus*, *Polymorphus magnus*, *Acanthocephalus ranae* and *A. lucii* were studied. The distribution of DNA in hypodermal nuclei was specific to each species.

G.I.P.

1285—Chromosoma. Berlin.

- a. BAUER, H. & LE CALVEZ, J., 1944.—"Das Verhalten der Chromosomen von *Ascaris megalocephala* nach Röntgenbestrahlung." 2 (6), 593-617.

4315—BAZITOV, A. A., 1967. [Data on the use of phase contrast and three-dimensional microscopy in comparative cytological and helminthological research.] *Dokl. II nauch. Konf. Kafedry Biol. Kemerov. gosud. med. Inst.* [Conference on theoretical and practical problems in parasitology.] Kemerovo, pp. 10-19. [In Russian.]

Phase contrast and 3-dimensional microscopy were used to study the structure of the cuticle and subcuticular layers of *Paramphistomum cervi*, *Moniezia expansa*, *Taenia saginata* and *Ascaris lumbricoides*. The growth changes of cells and changes in their nuclei are discussed. G.I.P.



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274—Biological Bulletin of the Marine Biological Laboratory,
Wood's Hole, Mass.

- a. BEAMS, H. W. & KING, R. L., 1937.—"The suppression of cleavage in ascaris eggs by ultracentrifuging." 73 (1), 99-111.

430—BECKETT, E. B. & BOOTHROYD, B., 1961. "The ultrastructure of the 'cilia-like' processes in the midgut of *Trichinella spiralis* larvae." European Regional Conference on Electron Microscopy, Delft, 1960. Proceedings, Vol. 2, pp. 938-941.

The epithelium of the mid-gut of *Trichinella spiralis* larvae, obtained from the diaphragms of mice after a 21 to 28-day infective period, has been shown to consist of uninucleate cells with a highly convoluted limiting membrane and cilia-like processes projecting into the lumen. These processes are not microvilli because they are bent in various directions with respect to the cell surface and they are not covered with a membrane which is continuous with that of the cell; in cross-section they are seen to consist of a central core within a tube, which is surrounded by a sheath of 12 to 14 separate fibres striated along their long axis; the whole structure is about 1,000Å in diameter; the free ends of the "cilia" seem to terminate hemispherically. No basal body has been observed so they are not typical cilia. S.W.

2700—BEDNARZ, S., 1964. "Cykl rozwojowy komórek rozrodczych u *Digenea* (Trematodes)." [The developmental cycle of germinal cells in *Digenea* (Trematoda).] [Abstract.] *Wiad. parazyt.*, 10 (4/5), 541-542. [English summary p. 542.]

4316—BEHME, R. & PASTERNAK, J., 1969. "DNA base composition of some free-living nematode species." *Can. J. Genet. Cytol.*, 11 (4), 993-1000.

The mean base compositions, guanine plus cytosine (% GC), of DNA samples from 5 free-living nematodes were determined by CsCl equilibrium buoyant-density centrifugation and thermal denaturation studies. Both methods gave similar results, indicating that there is no extensive replacement of the usual bases in nematode DNA. From the ultracentrifugation studies, the % GC content of the DNA of *Caenorhabditis briggsae*, *Turbatrix aceti*, *Rhabditis* (R.) *anomala*, *Panagrellus redivivus* and *P. silusiae* was 36, 40, 42, 44 and 44, respectively. DNA from *T. aceti* showed 2 distinct ultra-violet absorption bands in a CsCl gradient. The band at 1.688 g. per cu. cm. proved to be a polysaccharide. It gave a distinct refractive index pattern when viewed with the schlieren optical system, was insensitive to DNase treatment and was removed by α -amylase treatment. The material banding at 1.699 g. per cu. cm. was DNA. This band produced no disturbance in the refractive index gradient, was not altered by α -amylase treatment but was DNase sensitive. Since *P. redivivus* and *P. silusiae* had the same DNA base composition, their ability to interbreed was examined. They were cross-fertile and the offspring were fully fertile.

[A.S.] A.J.

536—Protoplasma.

- a. BEJDL, W., 1951.—"Der Einfluss von Ultraschallwellen auf die Entwicklung von Froscheiern und auf die Zellteilung der Eier des Pferdespulwurms mit besonderer Berücksichtigung der Grenzflächenspannungen." 40 (1), 54-75.

4599—BELTON, J. C. & BELTON, C. M., 1971. "Freeze-etch and cytochemical studies of the integument of larval *Acanthatrium oregonense* (Trematoda)." *J. Parasit.*, 57 (2), 252-260.

The tegument of sporocysts and cercariae of *Acanthatrium oregonense* from naturally infected *Oxytrema siliqua* was studied using freeze-etching, cytochemistry and electron microscopy. The tegument of the sporocyst consists of granular material interspersed with several unit membranes which are arranged in a lamellar pattern parallel to the outer surface. Large lipid vacuoles may occur between the membranes resulting in variations in tegumentary thickness between 0.5 and 1.5 μ . Numerous slender microvilli project from the outer surface and appear as pockmarks when broken during fracture. Acid mucopolysaccharide was detected in the vesicular layer of the cercarial body tegument which is released on to the body-surface. The freeze-etch data on the tegument of emerged cercariae support previously published descriptions based on electron micrograph interpretation [see *Helminth. Abstr.*, 37, No. 833].
M.B.B.

96 BEVERLEY-BURTON, M. ; SWEENEY, P. R. Intranuclear, paracrystalline inclusions in various cells of *Quinqueserialis quinqueserialis* and *Notocotylus urbanensis* (Trematoda: Notocotylidae). *Canadian Journal of Zoology* (1972) 50 (3) 345-348 [En, fr] Dept. of Zoology, College of Biological Science, Univ. of Guelph, Ontario, Canada.

Intranuclear, paracrystalline inclusions measuring up to 3.9 μ in diameter were observed in tegumental, parenchymal and muscle cells of *Quinqueserialis quinqueserialis* and *Notocotylus urbanensis* from *Ondatra zibethica*. Ultrastructural observations showed that the inclusions were closely associated with the nucleolus and that the centre-to-centre spacing of the electron-dense parallel line pattern was about 200 Å. In some inclusions, a lattice pattern was seen. Both structural and preliminary histochemical findings suggest that the inclusions may be proteinaceous. It is considered possible that the inclusions may be associated with a virus infection or that they may represent storage sites. The paper is illustrated by one page (unnumbered) of electronmicrographs. [AS]
AJ

5993—BILQEES, F. M., 1968. "Somatic cell division in *Taenia crassiceps* (Zeder, 1800) (Cestoda)." *Zool. Anz.*, 181 (5/6), 450-454.

Mitotic cell division was observed in somatic nuclei in the differentiating scolex and budding zone of *Taenia crassiceps*. No nucleoli were observed and the exact number of chromosomes (probably between 8 and 18) was not determined.
C.W.G.

1274—BIRD, G. W., GOODMAN, R. M. & MAI, W. F., 1968. "Observations on the embryogenesis of *Trichodorus christiei* (Nematodea: Diphtherophoroidea)." *Can. J. Zool.*, 46 (2), 292-293.

Trichodorus christiei eggs were laid in the single cell stage. The first 2 cleavages were transverse to the longitudinal axis of the egg, forming 4 blastomeres of similar size. Metaphase chromosomes were approximately 3 μ in length. 1st-stage juveniles were recognizable after 96 hours, and emerged from the egg 100 to 120 hours after it was laid. Stomatal armature was well developed after 96 hours. The oesophagus and intestine developed shortly before emergence.
[A.S.] S.W.A.

2138—BJÖRKMAN, N. & THORSELL, W., 1962. "The fine morphology of the mitochondria from parenchymal cells in the liver fluke (*Fasciola hepatica* L.)." *Experimental Cell Research*. New York, 27 (2), 342-346.

Mitochondria of parenchyma cells from the posterior part of *Fasciola hepatica* are basically similar in structure to mitochondria from other cell types. However, parenchyma cell mitochondria are characterized by having only few cristae. The relatively great density of the mitochondrial matrix may be due to the presence of lipids. The morphology of these mitochondria is thought to be related to the ability of flukes to survive in an environment low in oxygen.
K.A.W.

- 2139—BJÖRKMAN, N. & THORSELL, W., 1963. "On the fine morphology of the formation of egg-shell globules in the vitelline glands of the liver fluke (*Fasciola hepatica* L.)." *Experimental Cell Research*. New York, 32 (1), 153-156.

Vitelline cells of *Fasciola hepatica* contain a round nucleus, few mitochondria which have few cristae, and an extensive granular endoplasmic reticulum. Peripheral globules of the mature cells consist of dense spheres enclosed in membranes and which sometimes have a "labyrinthine internal structure". The development of the endoplasmic reticulum is characteristic of protein-secreting cells. Yolk production by the vitelline cells is classed as a type of holocrine secretion. K.A.W.

611—Bulletin de la Société Zoologique de France.

- d. BÔBIN, G., 1949.—"Remarques cytologiques sur les cellules graisseuses de *Glossosiphonia complanata* L. (Hirudinée Rhynchobdelle)." 74 (4/5), 300-307.

407—Dokladi Akademii Nauk SSSR.

- a. BOGOMOLOVA, N. A., 1956.—[The role of nucleic acids in the oogenesis and fertilization of *Fasciola hepatica* L.] 110 (3), 461-464. [In Russian.]

(407a) Bogomolova describes the content of desoxyribonucleic acid and ribonucleic acid in the oogonium, oocyte, vitelline cell, spermatozoon and young zygote of *Fasciola hepatica* and illustrates sections of the stained cells. The observations showed, for example, that the entire spermatozoon is intensely Feulgen-positive but the intensity falls when it swells after entering the egg. Its chromatin contains some ribonucleic acid. In the zygote the amount of desoxyribonucleic acid diminishes with the growth of the two pronuclei, which contain equal small amounts of the acid when fully formed. G.I.P.

- 2082—BOGOMOLOVA, N. A., 1957. [Leningradski sanitarno-gigienicheski meditsinski institut.] [Cytochemical examination of the miracidium of *Fasciola hepatica* L.] *Dokladi Akademii Nauk SSSR*, 117 (2), 313-315. [In Russian.]

Bogomolova had studied cytochemically the distribution of nucleic acids (DNA and RNA), proteins, glycogens and fats in the miracidium of *Fasciola hepatica*. The results show that the germinal cells of the miracidium, being rich in nucleic acids and proteins and lacking reserve food substances, have greatest similarity to the sex cells of adult flukes, but they do not allow differentiation of the germinal cells into male and female cells. G. I. Pozniak

- 4774—BOGOYAVLENSKI, Yu. K., 1964. [On the microscopical structure of the integuments of some intestinal Strongylata.] *Helminthologia*, 5 (1/4), 167-172. [In Russian: English & German summaries pp. 171-172.]

The structure of the cuticle and hypodermis in *Oesophagostomum columbianum* and *Delafondia vulgaris* is described. In both species, the cuticle has 8 layers. The hypodermis of *O. columbianum* is composed of a thin non-nucleated subcuticle and 4 longitudinal ridges, of which the 2 lateral ones contain 2 types of nuclei (large and small). In *D. vulgaris* the subcuticle has small round nuclei and the 2 lateral ridges contain only large oval nuclei. G.I.P.

- 4780—BOGOYAVLENSKI, Yu. K., 1965. [Microscopic study of the cuticle and hypodermis of the nematode *Eustrongylides mergorum* (Rudolphi, 1809).] In: [Parasitic worms of domestic and wild animals: Papers on helminthology presented to Prof. A. A. Sobolev on the 40th anniversary of his scientific and teaching activity.] *Vladivostok: Dalnevostochnii Gosudarstvennii Universitet*, pp. 66-70. [In Russian.]

74—BOGOYAVLENSKI, Yu. K., 1964. [On the microscopical structure of the integuments of some intestinal Strongylata.] *Helminthologia*, 5 (1/4), 167–172. [In Russian: English & German summaries pp. 171–172.]

The structure of the cuticle and hypodermis in *Esophagostomum columbianum* and *Delafondia vulgaris* is described. In both species, the cuticle has 8 layers. The hypodermis of *O. columbianum* is composed of a thin non-nucleated subcuticle and longitudinal ridges, of which the 2 lateral ones contain 2 types of nuclei (large and small). In *D. vulgaris* the subcuticle has small round nuclei and the 2 lateral ridges contain only large oval nuclei.

G.I.P.

925—BOGOYAVLENSKIĬ, Yu. K.; KOROLEVA, Kh. [N.] A., 1967. "Structure of the integument of *Ascaridia galli* during its ontogenesis." In: Zuckerman, B. M.; Brzeski, M. W.; Deubert, K. H. [Editors], "English translation of selected East European papers in nematology." *East Wareham, Massachusetts: University of Massachusetts*, pp. 36–40. [En]

The development of the integument of *Ascaridia galli* was studied up to the 50th day in experimentally infected chickens. No differences were seen in cuticle structure between younger and older stages. Cell walls were distinguishable in the subcuticle from the 5th to the 25th day; by the 30th day, the subcuticle was syncytial. The lateral cords were clearly divided into 2 parts by the 25th day. On the 10th, 15th and 20th days, the tissues of the cord were heavily vacuolated, and up to 25 nuclei were observed. The largest concentration of glycogen was observed on the 25th day and was found in the subcuticle, lateral and median cords and in muscle cells. [For the bibliographical reference to this paper, see *Helminthological Abstracts*, 38, No. 5194.] C.W.G.

2701—BOLLA, R. I. & ROBERTS, L. S., 1968. "Gametogenesis and chromosomal complement in *Strongyloides ratti* (Nematoda: Rhabdiasoidea)." *J. Parasit.*, 54 (5), 849–855.

Germinal cells in adult and juvenile *Strongyloides ratti* were studied, referring especially to gametogenesis and the chromosomal complements of the parasitic and free-living stages. The diploid number in the free-living females is 6, and there is apparently a single meiotic division. This division is reductional and, at least in some eggs, a polar body is emitted. Sperm penetration takes place, but fusion of male and female pronuclei was not observed. Therefore, pseudogamy in the free-living stage is confirmed. How the diploid number is re-established is not clear, but some embryos appear to develop with the haploid number. Observations on germinal primordia of the filariform and rhabditiform L_3 juveniles suggest that embryos with haploid numbers of chromosomes may produce parasitic females, while diploid embryos produce free-living adults. The male diploid number is 5, and spermatogenesis also appears to involve a single reductional meiotic division. Parthenogenesis in the parasitic female is again confirmed since no parasitic males are found and no sperm are observed in the reproductive tract of the female parasite. Gametogenesis in the parasitic female was not studied, but nuclei in the germinative zone of this form have either 3, 5 or 6 chromosomes.

[A.S.] S.W.

5151—BOLLA, R. I. & ROBERTS, L. S., 1971. "Developmental physiology of cestodes. IX. Cytological characteristics of the germinative region of *Hymenolepis diminuta*." *J. Parasit.*, 57 (2), 267–277.

The germinative region of developing *Hymenolepis diminuta* is defined on the basis of cytological characteristics and DNA synthetic activity as beginning 200 μ posterior to the apex of the scolex, and extending posteriorly to the point of germinal primordia formation. The structure of the germinative cell type in this region is described. The kinetics of cell division in the germinative region were studied, and estimates of the duration of G_1 (period between the end of telophase and the beginning of DNA synthesis), S (period of DNA synthesis) and G_2 (period between the end of S and the beginning of prophase) were 3.0, 2.3 and 3.2 hours, respectively. The time for a complete mitotic division is estimated to be over 8.5 hours.

[A.S.] A.J.

1423—BONSDORFF, C. H. VON & TELKKÄ, A., 1965. "The spermatozoon flagella in *Diphyllolobothrium latum* (fish tapeworm)." *Z. Zellforsch. mikrosk. Anat.*, 66 (5), 643–648.

The tail of the spermatozoon of *Diphyllolobothrium latum* has two filament complexes similar to patterns of filaments found in other flagella, although each complex contains 9 peripheral and only one central filament rather than the typical 9+2 pattern. Only a single filament complex is present in the tip of the tail. Basally the posterior tip of the nucleus occurs between the two filament complexes. A row of tubular filaments occurs inside the cell membrane in the areas between filament complexes. Cilia of typical 9+2 filament organization occur in the wall of the seminiferous duct. The structure of flatworm sperms and their development are briefly discussed.

K.A.W.

5994—BONSDORFF, C. H. VON & TELKKÄ, A., 1966. "The flagellar structure of the flame cell in fish tapeworm (*Diphyllolobothrium latum*)." *Z. Zellforsch. mikrosk. Anat.*, 70 (2), 169–179.

The 50 to 80 flagella of the flame cell of *Diphyllolobothrium latum* arise from a compact basal plate which contains basal bodies, rootlets and microtubules. The tubule of the flame cell arises as a double row of longitudinal rods joined by a fine membrane, above which the wall of the tubule is continuous and contains a band of circularly oriented fibrils. Flagella of the flame are hexagonal in cross section and closely packed together. Flagella occur randomly in 2 orientations within the flame, at 180° to each other with respect to the position of peripheral doublet number one. Outermost flagella of the oval flame may lack the outer fibres of the axial complex and part of the flagellar membrane. Thus, the integrity of the entire flame appears to be dictated by the oval cross section of the tubule. The reversed orientation of the axial filament complexes is implicated in a 2-dimensional motility of the flame; the recovery stroke of half the flagella is in the same direction as the effective stroke of the rest, so while half are finishing their stroke the rest are just beginning theirs. The paper is illustrated by 8 electron photomicrographs.

K.A.W.

2859—BOYES, J. W. & ANDERSON, R. C., 1961. "Meiotic chromosomes of *Cystidicola stigmatura* and *C. cristivomeri* (Nematoda: Spiruroidea)." *Canadian Journal of Genetics and Cytology*, 3 (3), 231-236.

In *Cystidicola stigmatura* and *C. cristivomeri* there is no indication that cytokinesis does occur during spermatogenesis until after the second meiotic division is completed. At first metaphase five bivalents and one univalent are distinguishable. The univalent is an acrocentric and heterochromatic sex chromosome which goes to one pole at first anaphase; the bivalents divide regularly. The chromosomes proceed almost directly from first anaphase to second prophase. Each spermatid receives either five or six chromosomes which remain separate and distinct for some time. In both species the karyotypes total about 10μ in length and are very similar. Photomicrographs illustrate the paper. S.W.

276—BRADBURY, S., 1958. [Department of Zoology, University Museum, Oxford, U.K.] "A cytological and histochemical study of the connective-tissue fibres of the leech, *Hirudo medicinalis*." *Quarterly Journal of Microscopical Science*, 99 (2), 131-142.

Connective tissue fibres and ground-substance in *Hirudo medicinalis* resemble those in *Glossiphonia complanata* in general form and chemical composition, being differentiated into "cortex" and "medulla". The "cortex" contains arginine and acid mucopolysaccharide but no tyrosine or lipids, indicating that it is collagenous, as is confirmed by the X-ray diffraction pattern. The "medulla" is an extension of the fibrocyte. The cytoplasm of the fibrocyte contains mitochondria, spherical lipochondria about 1μ in diameter, larger triglyceride droplets, and diffuse phospholipid and granular accumulations of acid mucopolysaccharide. There seems to be a higher proportion of the last in the ground substance for *Hirudo* than in that for *Glossiphonia*. L. R. Richardson

*2138—BRADBURY, S. & MEEK, G. A., 1958. "The fine structure of the adipose cell of the leech *Glossiphonia complanata*." *Journal of Biophysical and Biochemical Cytology*, 4 (5), 603-607.

289—Nature. London.

- a. BREMNER, K. C., 1954.—"Cytological polymorphism in the nematode *Haemonchus contortus* (Rudolphi 1803) Cobb 1898." [Correspondence.] 174 (4432), 704-705.

(289a) Bremner has studied the chromosomes of *Haemonchus contortus* from sheep and cattle. The diploid number for both forms is eleven in the males and twelve in the females but whereas in those from sheep the gonial metaphase chromosomes are all of similar size, in those from cattle there is one very large chromosome in the male and two in the female. This difference appears to be constant. The author was able to demonstrate experimentally the existence of a low percentage of a fertile hybrid form, but there is no evidence of naturally occurring hybrids to date. The work is continuing. S.W.

197—Australian Journal of Zoology.

- a. BREMNER, K. C., 1955.—"Cytological studies on the specific distinctness of the ovine and bovine 'strains' of the nematode *Haemonchus contortus* (Rudolphi) Cobb (Nematoda: Trichostrongylidae)." 3 (3), 312-323.

(197a) Bremner confirms from cytological studies that the sheep and cattle strains of *Haemonchus contortus* are distinct species. The chromosome number for each form is $2n=11$ (male) and $2n=12$ (female) and all the autosomes are 3μ long; the X-chromosomes, however, measure 3μ in the sheep form and 8μ in the cattle form. His observations were made on natural infestations in calves, sheep and goats, experimental pure infestations and experimental mixed infestations. Only three hybrids were found among 77 F_1 females examined after infecting a lamb with 7,000 larvae from sheep and 7,000 from cattle but hybrid females were able to produce viable eggs; there does therefore appear to be a fertility barrier. Some degree of host specificity was also demonstrated. S.W.

697—Proceedings of the Royal Academy of Sciences, Amsterdam.

- a. BRETSCHNEIDER, L. H., 1954.—"Die submikroskopische Struktur der Darmzelle von *Ascaris suilla*. Ein elektronenoptischer Analyse." Series C, 57 (4), 524-539. [English summary p. 538.]

(697a) Bretschneider reports on his detailed studies of the intestinal cells of *Ascaris lumbricoides* from pig (both before and after food intake) by means of the electron microscope. The cells contain at their apex hollow, rod-like structures filled with cytoplasm which carry substances towards the cells; tubules at the base of the cells serve for drainage from the cell to the body-cavity (the basal membrane is porous). Descriptions of the granules and the cytoplasm are also given, and it is noted that changes in the size and shape of the mitochondria seem to be related to accumulation of proteins. The nucleoli appear to be highly active in the metabolic process. The work is to be continued. A.E.F.

774—Proceedings of the Royal Academy of Sciences, Amsterdam.

- a. BRETSCHNEIDER, L. H., BRAAMS, W. G., BLOEMSMA, F. F. S. N. & STALFOORT, T. G. J., 1952.—"Struktur und cytochemie der Darmzelle von *Ascaris suilla* Duj. 1. Die Stratifikation des Zellinhaltes der normal ernährten Zelle mit der Ultrazentrifuge." Ser. C, 55 (4), 407-415. [English summary p. 415.]

(774a) Small pieces of intestine of *Ascaris lumbricoides* from pigs (about 1 cm. cubes) were centrifuged at 283,000 × g. for 30 minutes in their own body-fluid and the general cell picture, nucleus, mitochondria, A- and B-granules, Golgi body, thymonucleic acid, ribonucleic acid, fat and glycogen were studied by different histological techniques. The stratification of cell particles in baso-apically centrifuged cells did not give the expected reverse from those apico-basally centrifuged. All particles in the cell were not arranged according to their specific weight. This was due to two barriers: a denser boundary between plasma zones 3 and 4 and the ampler compact glycogen zone in the centre of the cell which is difficult to displace owing to the close connection between glycogen and ground cytoplasm. The very strong centrifugal forces required to stratify the cell contents are probably due to these barriers. R.T.L.

355—Annales du Musée Royal du Congo Belge. Série in-4°, Sciences Zoologiques.

- a. BRIEN, P., 1954.—"Deux formes larvaires de trématodes congolais. La parthénogenèse—le cycle des cellules germinales." 1, 153-162.

(355a) Brien redescribes *Cercaria patialensis* from *Melanoides anomala* in a small river near Sakania. From *Lanistes procerus* found at Maka, on the upper Lualaba, he describes a mass of thread-like sporocysts waving their free ends in the mantle cavity. The proliferation of the reproductive cells of larval trematodes is discussed and it is suggested that the process (intermediate between asexual and sexual reproduction) be called parthenogony. It differs from ovum-formation in the absence of maturation divisions and from sporogony in that the proliferating cells are not originally somatic. The proliferating cells are derived instead from a reserve of reproductive cells in the previous asexual stage, a reserve which can be traced to a propagatory cell formed early in the segmentation of the previous larva. Brien questions the justification of considering the propagatory cell a primordial germ cell since, in giving rise to the reproductive reserve, it will in turn form both somatic and reproductive tissue in the next generation. M.MCK.

1354—BRIEN, P., 1970. [Gametogenesis and sex differentiation.] "Gamétogenèse et sexualisation." *Année biol.*, 9, 374-391.

The origin of germ-cells, activation of germ-cells and sexual orientation of gametes in spermatogenesis and oogenesis are considered in a variety of plants and animals with particular regard to the roles of genetic and epigenetic factors. Among other groups, examples are quoted from digenetic life-cycles. The species cited are *Fasciola hepatica* and *Gyrodactylus*. A.J.

- d. BRITT, H. G., 1941.—“Preliminary cytological observation in trematodes.” [Abstract.] 2
(6) [Virginia Academy of Science Proceedings for the year 1940-1941], p. 186.

764—Bulletin Biologique de la France et de la Belgique.

- a. BRUN, J., 1955.—“Evolution de la prophase méiotique chez *Caenorhabditis elegans* Maupas 1900, sous l'influence de températures élevées.” 89 (3), 326-346.

(764a) Brun has studied the effect of temperature on the nuclear divisions during oogenesis in *Caenorhabditis elegans*. Between 13°C. and 20°C. the behaviour remains practically normal. When maintained at temperatures from 24°C. to 30°C. oogenesis becomes very abnormal; in spite of a certain stability in pachytene the ovary becomes progressively disorganized and the nuclei are eliminated. Doubling and further multiplication of the chromosomes and the formation of huge hyperchromatic elements are the most striking manifestations. At 31°C. to 32°C. the further evolution of the oocytes is blocked almost completely, the cells developing extremely slowly and abnormally. The pathological character of these changes is demonstrated if the animals are returned to 13°C. when anomalies analogous to those which develop after simple treatment at 24°C. to 30°C. are observed. Nematodes, still at the stage of spermatogenesis, which are treated at temperatures of 31°C. to 32°C. become incapable of proceeding to oogenesis, but if returned to temperatures between 13°C. and 28°C. this will occur although with abnormalities. The possible significance of these phenomena in the evolution of forms parasitic in warm-blooded animals is discussed. S.W.

- 1900—BURCH, J. B., 1960. [Mollusc Division, Museum of Zoology, University of Michigan, U.S.A.] “Chromosome numbers of schistosome vector snails.” *Zeitschrift für Tropenmedizin und Parasitologie*, 11 (4), 449-452. [German summary p. 451.]

The haploid chromosome number of *Planorbina* (= *Australorbis*) *glabratus* and *P.* (= *Biomphalaria*) *sudanica* is 18. The haploid number of *Bulinus truncatus* and *B.* (*Physopsis*) *ugandae* is 36. Burch presents evidence suggesting that the two species of *Bulinus* are tetraploids. Polyploidy appears to be more common in fresh-water pulmonate snails than previously thought. The “strain” differences of certain species of *Bulinus* in their ability to be infected with *Schistosoma haematobium* may be correlated with the degree of polyploidy of the snail population. Photomicrographs and camera lucida drawings show various phases of meiotic chromosomes. J. W. Smith

- 2860—BURTON, P. R., 1960. “Gametogenesis and fertilization in the frog lung fluke, *Haematoloechus medioplexus* Stafford (Trematoda: Plagiorchiidae).” *Journal of Morphology*, 107 (1), 93-121.

In *Haematoloechus medioplexus* spermatogenesis results in 32 spermatids joined in a rosette by short cytoplasmic stalks. The centriole divides at metaphase of the first meiotic division resulting in four centrioles in each primary spermatocyte. Secondary spermatocytes each receive two centrioles and divide to form two spermatids each with one centriole. During spermiogenesis the centriole enlarges and acts as an organizing centre from which the cytoplasm grows out as a filament into which the nucleus passes; some, but not all, of the mitochondria move into the core of the filament, the rest remaining in the residual cytoplasmic mass. The fully formed spermatozoa consist of a short acrosome, a shaft of chromosomal material and a tail made up of a long middle piece and an undulating tail piece, the whole measuring about 400μ. Oogenesis commences in the ovary but does not proceed beyond diplotene until the oocyte is penetrated by the sperm head. Two polar bodies are extruded and the pronuclei form and fuse. The diploid chromosome number is 22. The paper is illustrated by 49 line drawings and 27 photomicrographs and there is a comprehensive list of references to papers on gametogenesis in trematodes. S.W.

- 2521—BURTON, P. R., 1961. [The University of North Carolina, U.S.A.] “A cytological study of gametogenesis in the frog lung fluke, *Haematoloechus medioplexus* (Trematoda: Plagiorchiidae).” *Dissertation Abstracts*, 21 (9), 2831.

In *Haematoloechus medioplexus* the spermatids each contain a single centriole and occur in rosettes of 32. After formation of the sperm a vacuolated mass of cytoplasm containing some mitochondria is left behind; each sperm is about 400μ long. Sperm penetration must take place before meiosis in the oocytes will proceed beyond diplotene. Small bodies are released from the nucleoli of older oocytes which pass through the nuclear membrane and aggregate in the cytoplasm; after sperm penetration these bodies disappear. The diploid chromosome number of *H. medioplexus* is 22. J. W. Smith

- 1234—BURTON, P. R., 1967. "Fine structure of the reproductive system of a frog lung fluke. II. Penetration of the ovum by a spermatozoon." *J. Parasit.*, 53 (5), 994-999.

In *Haematoloechus medioplexus*, the plasma membrane of the spermatozoon fuses, along the entire length of the cell, with that of the ovum. An acrosome is not present in these spermatozoa. Upon fusion of gametes, the plasma membrane and peripheral microtubules of the spermatozoon remain associated with the surface of the ovum, although the surface area of the ovum is not increased in proportion to that of the spermatozoon with which it unites. After fusion, however, the volume of the ovum is increased by about 200 cu. μ , which is the approximate volume of an entire spermatozoon. [A.S.] M.B-B.

- 2986—BURTON, P. R., 1968. "Effects of various treatments on microtubules and axial units of lungfluke spermatozoa." *Z. Zellforsch. mikrosk. Anat.*, 87 (2), 226-248.

Sperm of *Haematoloechus medioplexus* from the lungs of *Rana pipiens* were treated in various ways and their microtubules and axial units subsequently studied in sectioned and negatively-stained material. Microtubules and axial units were generally unaffected by exposure to colchicine, cold and KCl, although with KCl certain lateral projections from doublet tubule A appeared more prominent in negatively-stained preparations. Both mercaptoethanol and urca had a dissociative effect on doublet tubules and microtubules. Pepsin-HCl initially digests the dense region associated with the A tubule of a doublet pair and the core of the axial unit; microtubules and B tubules of doublet units are later digested. In microtubules, there appears to be a proteinaceous material in the lucent central region which is digested before the disappearance of the wall of the microtubule. Further evidence is presented indicating that the characteristically helical wall of the microtubules is made up of spherical subunits about 50 Å in diameter, with about 8 subunits in one turn of the helix. Under certain conditions, the helical structure may be altered to form a wall comprised of longitudinal filaments. It is emphasized that not all microtubules are structurally and chemically equivalent, and it follows that all microtubules do not share a common function. [A.S.] D.A.Cz.

- 1355—BURTON, P. R., 1970. "Optical diffraction and translational reinforcement of microtubules having a prominent helical wall structure." *J. Cell Biol.*, 44 (3), 693-699.

[Microtubules from *Haematoloechus medioplexus* sperm.]

- 2938 BUZZELL, G. R. Behaviour of the nucleolus during mitosis in the sporocyst of *Fasciola hepatica* L. *International Journal for Parasitology* (1973) 3 (2) 269-270 [En, 1 pl (unpaginated)] Dept. of Zoology, Australian National Univ., Canberra, Australia.

Nucleoli were often observed in prophase nuclei in sporocysts of *Fasciola hepatica*. Photomicrographs of a flame cell and 3 germinal cells showing retention of the nucleolus are given. Not all prophase nuclei contain a nucleolus; no nucleoli were found in dividing cells at stages later than prophase. The nucleolus of *F. hepatica* sporocysts is considered to be either "persistent" or "semi-persistent" according to the system of Pickett-Heaps (1970) [*Cytobios* 6, 69-78]. MRNS

511—Proceedings of the Oklahoma Academy of Science.

- *a. CARPENTER, J. R., 1935.—“Some unusual mitotic and meiotic stages in *Ascaris megalocephala bivalens*.” [Abstract.] 15, p. 57.

745 CARTER, C. E.; WELLS, J. R.; MACINNIS, A. J. DNA from anaerobic adult *Ascaris lumbricoides* and *Hymenolepis diminuta* mitochondria isolated by zonal centrifugation. *Biochimica et Biophysica Acta* (1972) 262 (2) 135-144 [En] Dept. of Zoology, Univ. of California, Los Angeles, California 90024, USA.

Reorienting gradient zonal centrifugation was used to isolate large quantities of mitochondria from *Ascaris lumbricoides* and *Hymenolepis diminuta*. Electron-micrographs of mitochondrial DNA released from osmotically shocked mitochondria and from purified mitochondrial DNA revealed a circular molecule with an average contour length of $4.76 \pm 0.03 \mu$ in *H. diminuta* and $4.79 \pm 0.03 \mu$, in *A. lumbricoides*. Mitochondrial DNA was subsequently isolated from both species and characterized using equilibrium centrifugation in CsCl. The buoyant density was 1.690 g/cm³ in *A. lumbricoides* and 1.691 g/cm³ in *H. diminuta*. Estimates made from buoyant density measurements and thermal transition values indicated a base composition of 31% G + C [guanine + cytosine] in *A. lumbricoides* and 32% in *H. diminuta* mitochondrial DNA.[AS]. AJ

398—Journal of Parasitology

- †h. CHANG, P. C. H. & GRAHAM, G. L., 1957.—“Parasitism, parthenogenesis and polyploidy: the life cycle of *Strongyloides papillosus*.” 43 (5, Sect. 2), 13.

(398h) In the eggs of the parasitic phase of *Strongyloides papillosus* there are constant chromosomal differences. Normally the number of chromosomes is six. In other eggs there may be four and a small compact mass of Feulgen-positive material, designated “extrusion body”. Two chromosomes are frequently shorter than the other pair. Eggs occasionally contained two extrusion bodies but the chromosome number in these has not been determined. In the heterogenetic generation the large egg nucleus in virgin females contains two tetrad chromosomes differing in size, which rest against the nuclear membrane opposite each other. In “spermatized” females eggs occur with the tetrads side by side during polocyte formation following sperm entry. There is a single equational maturation division, but no meiosis. The resultant diploid female pronuclei have four chromosomes. Fusion with haploid male pronuclei produces viable triploid zygotes which develop into infective filariform larvae capable of further development into parthenogenetic parasitic females. In the triploid parthenogenetic parasitic generation the determinant factor, which may be genetic, for homogenetic or heterogenetic development lies between normal mitoses during oocyte growth and one or more abnormal cell divisions which may involve non-disjunction but simulate polocyte formation. R.T.L.

- 2355—CHIENG, T. C., 1960. “Further studies on the parenchymal cells of digenetic trematodes.” *Proceedings of the Pennsylvania Academy of Science*, 34, 166-172.

Chieng describes and figures the beta and alpha cells and haemocytes [these cells were described by Cheng & Provenza, 1960; for abstract see *Helm. Abs.*, 30, No. 1901] from the parenchyma of *Haastilesia tricolor* from *Lepus sylvaticus* in Pennsylvania, U.S.A. A table is given comparing measurements of these cells and their nuclei from *H. tricolor* and *Haematoloechus confusus*. E.I.S.

- 1496—CHIENG, T. C., 1963. “Mitotic division and differentiation of parenchymal beta cells in the lung fluke *Haematoloechus* sp.” *Transactions of the American Microscopical Society*, 82 (4), 396-400.

Beta parenchymal cells were observed to be undergoing mitosis in experimentally wounded but not intact specimens of *Haematoloechus* sp. Though an apparent mobilization of alpha cells was observed in the region of the wounds, no alpha cells were undergoing division. The results are discussed in relation to the general problem of wound healing and regeneration potentialities in trematodes. E.I.S.

324—Acta Zoologica Sinica, Peking.

- a. CHIANG, C. P., 1936. Preliminary observations on granular changes of yolk masses during development of eggs of *Diplodiscus*.] 7 (1), 17-30. [In Chinese: English summary p. 27.]

(324a) This paper is based on what Chiang describes as "the great discovery of Lepeshinskaya—the formation of cells from non-cellular 'living matter', such as the yolk globules of the hen's egg". With this in mind, Chiang studied the development of eggs of *Diplodiscus sinensis* and *D. japonicus*. He found that during the course of their development granules appeared in the yolk area. These granules eventually aggregated into spherical masses, each of which was soon provided with a membrane and often with a nucleus. That is to say, the essential components of a cell were then present. When these cells were mechanically pressed out from the eggs and vitally stained with methylene blue, the cytoplasm took little stain but the nucleus became deep blue. On the death of the embryo, all the contents of the egg were transformed into these granular cells, and in one case they were actively dividing. Chiang points out that this work is preliminary in nature and more intensive work is needed in order to find the relationship between the granular cells and the embryo of the trematode in question. He states that the germ-cell cycle of trematodes has puzzled zoologists in the last few decades but should be re-examined in the light of the new direction given by the Russian cytologist Lepeshinskaya.

L.S.Y.

49—Proceedings of the Helminthological Society of Washington.

- g. CHITWOOD, B. G. & CHITWOOD, M. B., 1938.—"Further notes on intestinal cell inclusions in nemas." 5 (1), 16-18.

896—CHUBRIK, G. K., 1970. [Character of the structure and secretory activity of intestinal epithelial cells of *Diplodiscus subclavatus*.] *Parazitologiya*, 4 (1), 43-47. [In Russian: English summary p. 47.]

The histological and histochemical structure of intestinal cells of *Diplodiscus subclavatus* is described and illustrated with photomicrographs. The epithelial cells lining the intestinal caeca of *D. subclavatus* are large, rectangular and the cytoplasm is rich in RNA. Their free surfaces bear microvilli which are supposed to take part in digestion. During digestion, the epithelial cells do not undergo marked morphological changes as in *Fasciola hepatica*. However, the microvilli appear thicker and shorter in regions of the intestine where food is present.

J.A.D.

35—Transactions of the American Microscopical Society.

- b. GIORDIA, H., 1956.—"Cytological studies of the germ cell cycle of the trematode family Buccaphalidae." 75 (1), 103-116.

without cytoplasmic tails. Larval forms were observed in sections of infected clams, *Lampsilis siliquidica*. The sporocyst is a hollow structure covered by a thin cuticle; its lumen is lined by a layer of mesenchymal (parenchymal) cells lying axially to a very thin layer of longitudinal and circular muscles; germinal cells with a great affinity for haematoxylin occur in the mesenchymal layer and these produce cercariae by the formation of germinal cysts within the sporocyst wall and by proliferation into the lumen forming large amorphous masses. The redial generation was not observed but it is possible that it might occur at another time of the year. The diploid chromosome number was 12.

S.W.

1822—COIL, W. H., 1970. "Studies on the biology of the tapeworm *Shirolea inermis* Fuhrmann, 1908." *Z. ParasitKde*, 35 (1), 40-54.

Histological studies on the oogenotop of *Shirolea inermis* from *Limnodromus griseus* are reported. The morphology is illustrated with photomicrographs and described in relation to egg formation and development. The taxonomic status of *S. inermis* is briefly discussed. M.R.N.S.

152—Quarterly Journal of Microscopical Science.

- a. COLLIER, jr., V., 1936.—"Studies on the cytoplasmic components in fertilization. I. *Ascaris suilla*." 78 (3), 397-418.

425—Annales de Physiologie et de Physicochimie Biologique.

- *a. COMANDON, J. & FONBRUNE, P. DE, 1934.—"Inscription cinématographique de mouvements protoplasmiques, pendant les premiers stades du développement d'oeufs d'*Ascaris mégalocéphala*." 10 (4), 995-998.

665—Natuurwetenschappelijk Tijdschrift.

- *a. CONINCK, L. A. P. DE, 1938.—"Eutelic." [Cell constancy in nemathelminths.] 20, Congress No., pp. 226-234.

263—Quarterly Review of Biology.

- a. CORT, W. W., 1944.—"The germ cell cycle in the digenetic trematodes." 19 (4), 275-284.

(263a) Steenstrup, who in 1842 first outlined the theory of alternation of generations of the digenetic trematodes, considered the reproduction in the sporocysts and rediae as an asexual process of internal budding. The view supported by the most recent observers and first put forward by Leuckart in 1886, is that the reproductive cells in the sporocysts and rediae can be traced back directly to the fertilized ovum. They never become true germ cells and the multiplication of the cells of the germinal line is a polyembryony of the original zygote or fertilized ovum during which numerous soma cells are split off to form the primary and secondary germinal sacs which contain the multiplying germinal cells and the embryos derived therefrom. R.T.L.

THAPAR COMMEMORATION VOLUME. A COLLECTION OF ARTICLES PRESENTED TO PROF. G. S. THAPAR ON HIS 60th BIRTHDAY, 1953, edited by J. Dayal & K. S. Singh.

- f. CORT, W. W., 1953.—"The germ cell cycle of the digenetic trematodes." pp. 41-50.

(434f) Cort reviews the published work on the germ cell cycles of digenetic trematodes. Recent studies support the hypothesis of germinal lineage which was proposed by Leuckart in 1887. According to this theory the reproductive cells in sporocysts and rediae can be traced back directly to the fertilized ovum. Although they never become true germ cells undergoing reduction divisions they remain separate from the somatic cells during the formation of the germinal sacs; consequently their reproduction is polyembryony of the original zygote. Although this is broadly true of many diverse groups of digenetic trematodes the actual mechanisms by which the germinal cells multiply vary greatly. Cort describes these mechanisms in members of the Paramphistomidae, Notocotylidae, Echinostomatidae, Philostomidae, Fasciolidae, Troglotrematidae, Hemiuridae, Lissorchiidae, Plagiorchoidea, Strigeatoidea, Spirorchidae and Schistosomatidae and discusses their possible phylogenetic significance. S.W.

160—Proceedings of the Helminthological Society of Washington

- s. CORT, W. W., AMEEL, D. J. & VAN DER WOUDE, A., 1954.—“Germinal development in the sporocysts of the blood flukes of turtles.” 21 (2), 85-96.

(160s) Cort *et al.* obtained *Spirorchis* eggs from naturally infected *Chrysemys picta*, cultured them and infected *Helisoma trivolvis* with the miracidia. The number of germ cells in the miracidia averaged twelve but in three-day-old mother sporocysts the germinal elements had increased to 25-40, some of which were already embryo daughter sporocysts. In 10-12 days the number increased to more than 300; from this time the embryos grew rapidly and the daughter sporocysts began to migrate to the digestive gland about 21 days after infection. Embryo daughter sporocysts contain 12-16 germinal cells and by the time they escape they contain 25-35 cercarial embryos in *Cercaria elephantis*. At this stage it became apparent that a second species was present, the daughter sporocysts containing a far larger number of cercarial embryos. At post-mortem of two of the turtles two types of adults were found although the second has not yet been identified or named. Germinal masses are not formed and the germ cells are scattered along the sporocyst wall and continue to produce the next generation for a considerable time after the first daughter sporocysts or cercariae have been liberated. S.W.

160—Proceedings of the Helminthological Society of Washington

- t. CORT, W. W., AMEEL, D. J. & VAN DER WOUDE, A., 1954.—“Further studies on the germinal development in the sporocysts of a bird schistosome, *Trichobilharzia stagnicolae* (Talbot 1936).” 21 (2), 97-106.

(160t) Continuing their observations on *Trichobilharzia stagnicolae*, Cort *et al.* have studied the sporocysts in experimental infections of *Stagnicola emarginata angulata*. In the miracidia the germ cells numbered from 21 to 30 and in the four-day-old mother sporocysts they had increased to about 60 germinal elements of which half were small embryos. Daughter sporocysts began to migrate to the digestive gland by about the 8th to 10th day and mature cercariae were liberated in about 21 days. No germinal masses were developed. The size of the snail hosts appeared to affect the size of the sporocysts and in young snails the germinal cells of the sporocysts were very crowded. S.W.

42—Nature. London.

- a. COTTEN, J., 1959.—“Chromosome number of the potato root eelworm, *Heterodera rostochiensis* Wollenweber.” [Correspondence.] 183 (4654), 128.

(42a) Cotten reports the finding of different numbers of chromosomes in the egg of the potato-root eelworm *Heterodera rostochiensis*. The usual number of chromosomes is 18, but eggs having $2n=20$ and 22 are not uncommon, while eggs with 19, 23 and 24 chromosomes may occur. One fertilized female contained eggs with 47 chromosomes. J.J.H.

- 558—COTTEN, J., 1960. “Observations on the cytology of the potato-root eelworm, *Heterodera rostochiensis* Wollenweber.” *Nematologica*. Supplement II, pp. 123-126. [German summary p. 125. Discussion p. 126.]

Two meiotic divisions are made by the eggs of *Heterodera rostochiensis*, the chromosomes being best defined in the first meiotic metaphase. By the first meiotic metaphase most eggs contain a sperm nucleus. They then measure about 1μ long. The chromosome number is not constant between different females, where 18, 20, 22 and occasionally odd numbers are found. On a few occasions the author was able to count the chromosomes in different eggs from the same female and then the number was constant. Two types of first meiotic division were observed; a normal “single” type and a “double” type which, in *Artemis salina*, for example, is associated with pseudogamy. C.C.D.

- 1424—COTTEN, J., 1965. “The pre-meiotic stages of oogenesis in *Heterodera rostochiensis* Wollenweber,” *Nematologica*, 11 (3), 335-336. [German summary p. 336.]

Development of the oogonia was followed in *Heterodera rostochiensis* from the mitotic divisions at the distal end of the ovary to the appearance of the meiotic prophase chromosomes in the primary oocytes. Over this period, considerable increase in size occurred in the oogonia. At one stage during their passage down the ovary, aggregates of nuclei which may have been nurse cells were observed lying between the developing oogonia. [A.S.]

1062—DAVEY, K. G. & BRECKENRIDGE, W. R., 1967, "Neurosecretory cells in a cestode, *Hymenolepis diminuta*." *Science, N. Y.*, 158 (3803), 931-932.

The presence of neurosecretory cells in the scolex of *Hymenolepis diminuta*, already suggested by electron microscope studies, were demonstrated using the paraldehyde-fuchsin technique. A group of nerve cells in the rostellum became progressively more fuchsinophilic between the 3rd and 16th days of development. The secretions were then released into their axons coinciding with the release of the first proglottis.

M.R.N.S.

5152—DAVIS, D. A. & BOGITSII, B. J., 1971. "*Gorgoderina attenuata*: cytochemical and biochemical observations on the digestive tracts of digenetic trematodes." *Expl Parasit.*, 29 (2), 320-329.

Electron microscopy of the gastrodermis of *Gorgoderina attenuata* demonstrated a syncytial epithelium. Underlying the gastrodermis is a basal lamina in which are embedded circular and longitudinal muscles. The luminal surface is extended as digitiform cytoplasmic extensions that apparently aid in the absorption of nutrients. The cytoplasm demonstrates an extensive system of rough endoplasmic reticulum, Golgi areas and numerous mitochondria. 3 types of membrane-delimited vesicles are noted. They are designated DV₁, DV₂ and DV₃. DV₁ and DV₃ vesicles demonstrate acid phosphatase activity and are interpreted as lysosomes and cytolysosomes, respectively. The basal plasmalemma is infolded at irregular intervals. No indication of endocytotic activity was noted.

[A.S.] C.W.G.

62—Archives d'Anatomie Microscopique et de Morphologie Expérimentale. Paris.

a. DELAVault, R., 1952.—"Étude cytologique des acides nucléiques chez un nématode libre (*Rhabditis elegans* Maupas 1900)." 41 (1), 41-68.

(62a) Delavault has studied in great detail the distribution of nucleic acids during gametogenesis in hermaphrodites and males, and fertilization and early development of *Rhabditis elegans*. Material fixed in either Zenker's or Helly's fixatives gave better results than that fixed in Carnoy's fluid; sections were stained by the Feulgen reaction, iron haematoxylin and eosin, or the Unna-Pappenheim technique which allowed both qualitative observations and spectrophotometric measurements to be made. The difficulties inherent in the material and the limitations imposed by the techniques are discussed. During oogenesis the distribution of ribonucleic acids in the cytoplasm remains homogeneous throughout the growth of the cells, but during spermatogenesis the pyrimiphilic substances become localized in definite zones in the cells. There appears to be a dilution, if not a diminution of the total amount of ribonucleic acid in the oocyte, but in the spermatocyte there is neither diminution nor dilution except possibly just at the time of mitosis when the chromatin increases at the expense of the cytoplasmic ribonucleic acids. It appears that there may be an increase in the total desoxyribonucleic acid in the nucleus during growth and a diminution at pachytene followed by a readjustment, but only further work, on more favourable material, will clarify this. s.w.

368—Bulletin de la Société Zoologique de France.

b. DELAVault, R., 1952.—"Recherches sur la gamétogenèse et la fécondation chez un nématode libre hermaphrodite." [Demonstration.] 77 (2/3), 234.

(368b) In this demonstration Delavault presented three slides of sections of *Rhabditis elegans*. The first showed that at the end of oogenesis the affinity of the cytoplasm for pyronin decreases and the second, that during spermatogenesis the distribution of ribonucleoproteins is not homogeneous as in oogenesis. The third slide showed the penetration of the ovum by the spermatozoid when an intensely pyrimiphilic zone appears round the male gamete. Delavault draws attention to the differences between the phenomena observed in *R. elegans* and those described in *Parascaris equorum* by other authors.

s.w.

12—Comptes Rendus des Séances de l'Académie des Sciences. Paris.

- b. DELAVAUULT, R., 1952.—"La teneur en acide désoxyribonucléique des noyaux sexuels chez un *Rhabditis* hermaphrodite." 234 (8), 884-885.

3023—DELAVAUULT, R., 1959. "Développement, croissance et fonctionnement des glandes génitales chez les nématodes libres." *Archives de Zoologie Expérimentale et Générale*, 97 (2), 109-208.

A very detailed comparative study was made of gametogenesis, development of the gonads and growth in a protandric, hermaphroditic free-living nematode, *Caenorhabditis elegans*, and in the dioecious nematode, *Rhabditis maupasi*. The comparative cytology of the ovary, testis and genital glands is also described. There are 54 figures which include tables, graphs and histograms, and a bibliography of 77 references. H.H.W.

3839—DEL CONTE, E., 1959. "Cytological and histochemical studies on the Mehlis' gland in *Corpopyrum* sp. (Trematoda, Digeneca)." *Archs Anat. microsc. Morph. exp.*, 59 (1), 9-20. [In French: English summary p. 19.]

The structure and histochemistry of Mehlis' gland of *Corpopyrum* sp. from *Tringa melanoleuca* is described. 2 types of cell, one cyanophilic and the other amphiphilic, were found. Both types contain acid epithelial mucins; the cyanophilic cells also contain glycogen and a neutral mucosubstance. The secretion discharged into the ootype is strongly cyanophilic and contains acid epithelial mucins and neutral mucosubstances. A.J.

306—Research Bulletin of the Panjab University, Hoshiarpur.

- a. DHINGRA, O. P., 1954.—"Gametogenesis and fertilization in *Isoparorchis curytremum*." No. 44 (Zoology), pp. 21-37.

(306a) Dhingra gives a very full illustrated account of gametogenesis and fertilization in *Isoparorchis curytremum*. The diploid number of chromosomes is 20. In the male cells the mitochondria form a cap-like mass close to the nucleus but they do not contribute to spermatozoon formation; two flagella are formed from a single centrosome. In the female cells two polar bodies are extruded of which the first undergoes division into two unequal halves. The author describes the Goigi apparatus which grows and divides during spermatogenesis but disappears in the spermatid. S.W.

491—Research Bulletin of the Panjab University, Hoshiarpur.

- j. DHINGRA, O. P., 1954.—"Spermatogenesis of a digenetic trematode, *Cyclocoelum bivesiculatum*." No. 61 (Zoology), pp. 159-168.

(491j) During spermatogenesis in *Cyclocoelum bivesiculatum*, the centrosomes divide and a single centrosomal granule comes to lie at the base of the spermatid nucleus and forms, together with the axial filament, the whole tail of the sperm which is both nuclear and cytoplasmic. A number of unusual structures were observed in the testes. These included small globules at the periphery which stained intensely with iron haematoxylin, larger faintly staining globules, spermatogonia which failed to divide properly and were observed in a polyaster condition or with the chromosomes scattered throughout the cytoplasm, fully developed oocytes surrounded by nourishing cells, and pycnotic masses. The diploid chromosome number is 20 and the largest pair is about 3μ long. S.W.

149—Research Bulletin of the Panjab University, Hoshiarpur.

- a. DHINGRA, O. P., 1955.—“Spermatogenesis of a digenetic trematode, *Cotylophoron elongatum*.”

(149a) Dhingra describes in detail and illustrates all stages of spermatogenesis in *Cotylophoron elongatum*. Mitochondria are present until late spermateleosis when they are cast off with the cytoplasm, but Golgi material was not observed. The sequence of divisions in *C. elongatum* resembles that in other forms but the division of the cytoplasm lags behind the nuclear divisions and reorganization of daughter nuclei. The spermatozoon consists of a nucleus, a centrosome and a flagellum and is not a purely nuclear structure. Centrosomes are visible at both meiotic divisions and a centrosomal granule from which the flagellum arises may be seen at the base of the spermatid. The haploid chromosome number is 8. s.w.

149—Research Bulletin of the Panjab University, Hoshiarpur.

- b. DHINGRA, O. P., 1955.—“Spermatogenesis of a digenetic trematode, *Gastrothylax crumenifer*.” No. 65 (Zoology), pp. 11-17.

(149b) During spermatogenesis in *Gastrothylax crumenifer* Dhingra observed degenerating spermatogonia, some unidentified nuclei and oocytes in the testes. Mitochondria are present in the earlier stages of spermatogenesis but remain in the residual cytoplasm and do not form any component of the spermatozoa. A centrosomal granule from which the flagellum arises is present in the spermatid and the spermatozoon consists of an elongated nucleus, a centrosome and a flagellum. The haploid chromosome number is 7. s.w.

149—Research Bulletin of the Panjab University, Hoshiarpur.

- c. DHINGRA, O. P., 1955.—“Gametogenesis, fertilization and cleavage in *Asymphyloglora* sp.” No. 66 (Zoology), pp. 19-29.

(149c) In *Asymphyloglora* sp. spermatogenesis follows the same general plan as reported for other digenetic trematodes but the spermatozoon is globular, not thread-like or spindle-shaped as found in other trematodes. During oogenesis reserve food material appears in the primary oocyte while it is within the ovary but disappears when the oocyte leaves the ovary. Two polar bodies are extruded with a little cytoplasm and the first enlarges and divides. The pronuclei enter into a resting stage before fusion and the fusion nucleus possesses two nucleoli. A centrosomal granule was observed when the two pronuclei were lying close together. The first cleavage division is unequal resulting in the formation of a small propagatory cell, which remains undivided, and a larger cell which continues to divide. The haploid chromosome number is 9. s.w.

3375—DIXON, K. E. & MERCER, E. H., 1967.

“The formation of the cyst wall of the metacercaria of *Fasciola hepatica* L.” *Z. Zellforsch. mikrosk. Anat.*, 77 (3), 345-360.

The activity of cercariae of *Fasciola hepatica* resulting in attachment to a substrate and transformation into a metacercaria is described and correlated with the deposition of the 4 cyst layers as seen by electron microscopy. The outermost layer of cercariae within rediae is considered to be a cellular embryonic epithelium. This epithelium accumulates mucopolysaccharide, mucoprotein and tanned protein granules apparently by release of these granules from their respective secretory cells within the muscle layers of the body. Before encystment the granules become stratified, with tanned protein granules outermost. Contraction of the body results in release of the granules by breakdown of the embryonic epithelium. The peripheral tanned

protein granules form the outer meshwork of the cyst, while carbohydrate-proteins become distributed in a fibrous form by rotatory movements of the body. The 3rd layer forms by release of more mucoprotein and mucopolysaccharide granules and modification of their contents into 3 zones. The innermost keratin layer forms by release of the rod-like scrolls. Keratin lamellae form by the unrolling of these scrolls facilitated by movements of the metacercaria. These secretory processes are considered to occur in several steps; (i) release of secretory granules from their secretory cell to the embryonic epithelium—cytocrine secretion; (ii) release of granules by breakdown of the epithelium—holocrine secretion; (iii) release of keratin rodlets without destruction of cells via eccrine secretion. Processes from keratin-forming cells are considered to form the syncytial tegument of the juvenile fluke. Extensive movements of the cystogenic cells are considered to take place. K.A.W.

692—DOBROKHOTOVA, I. I., 1965. [Changes in the cell composition of the intestinal epithelium in ascarids.] *Mater. nauch. Konf. (XIV)*, Leningrad. vet. Inst., May 24-31, 1965, pp. 187-189. [In Russian.]

Studying the cell structure of the middle gut of *Toxocara canis*, pig *Ascaris* and *Ascaridia galli*, Dobrokhotova observed dynamic changes in the cell composition. Some intestinal cells had 2 nuclei (? amitosis). In some epithelial cells a process of degeneration was observed and the 3 forms in which this process occurs in intestinal cells are described. G.I.P.

3876—DOBROKHOTOVA, I. I., 1969. [Inconsistency in the intestinal cell composition in nematodes.] *Dokl. Akad. Nauk SSSR*, 184 (3), 758-759. [In Russian.]

10 to 40% of individuals of the 6 nematodes studied (*Parascaris equorum*, pig *Ascaris*, *Toxocara canis*, *Ascaridia galli*, *A. columbae* and *Heterakis gallinae*) showed changes in the epithelial cells of the intestine, such as differences in the size, number and position of nuclei and so-called cytoplasmic degeneration. The author suggests that 2 processes are taking place, (i) a pathological process represented by the appearance of considerable granulation, including large granules in the cytoplasm, and of vacuoles around deformed parts of the cytoplasm, and (ii) a normal physiological process connected with the replacement of intestinal cells. The changes associated with the 3 possible ways in which cell degeneration occurs are described but the cell compensation process remains unexplained. G.I.P.

398—Journal of Parasitology

†bg. DOUGLAS, L. T., 1957.—"The spermatogenesis of two nematotaeniid cestodes." 43 (5, Sect. 2), 24.

(398bg) In the maturation of the nuclei in *Baerietta diana* and *Distoichometra kozloffi* n.sp. the prophase of the first division occurs simultaneously in all eight nuclei. The syncytial mass divides into individual cells at the metaphase. The eight binucleate masses reunite during late telophase to form an aggregate of 32 secondary spermatocytic nuclei which then form 64 spermatid nuclei. The nuclei elongate into a filiform spiral. An axoneme and middle piece spiral form a middle piece which is single. [*D. kozloffi* is not defined and is therefore a nomen nudum.] R.T.L.

†bh. DOUGLAS, L. T., 1957.—"Fertilization, maturation, and early cleavage in *Baerietta desmognathi* sp.nov. (Nematotaeniidae)." 43 (5, Sect. 2), 24.

(398bh) The only difference between the early cleavage pattern of *Baerietta desmognathi* n.sp. in *Desmognathus f. fuscus* and *B. diana* in *Batrachoseps attenuatus* is that the first cleavage in *Baerietta desmognathi* is slightly unequal resulting in a large and a small macromere. [*B. desmognathi* n.sp. is a nomen nudum.] R.T.L.

722—DOUGLAS, L. T., 1961. "Somatic pairing of chromosomes in normal and mutant strains of *Hymenolepis diminuta*." [Abstract.] *Journal of Parasitology*, 47 (4, Sect. 2), 54.

The reduction from 12 to 6 in the number of chromosomes of *Hymenolepis diminuta* during cleavage is thought to be due to somatic pairing of homologous chromosomes. Reasons are given for rejecting alternative hypotheses to explain the reduction and some other aspects of the genetics of the cestode are discussed. Preliminary attempts to correlate specific chromosomal aberrations with anomalies in proglottis morphology were unsuccessful. H.H.W.

- †b. DOUGLAS, L. T., 1953.—"The spermatogenesis of two nematotaeniid [nematotaeniid] cestodes." 4 (4), 231-232.

(698b) Douglas has studied spermatogenesis in two undescribed species of the Nematotaeniidae. Immediately preceding prophase of the first maturation division about 16 spermatogonia fuse to form a cytophoric syncytium; maturation of all spermatocyte nuclei in a cytophore is simultaneous. The spermatid nucleus elongates and appears filamentous in the mature spermatozoon. S.W.

- 2356—DOUGLAS, L. T., 1962. "Experimental studies on morphological variations in the cestode genus *Hymenolepis*. VI. Somatic pairing of chromosomes in normal and mutant strains of *H. diminuta*." *Experimental Parasitology*, New York, 12 (2), 134-154.

The chromosome structure of normal *Hymenolepis diminuta*, in which the diploid number appears to be 6, is described. Somatic pairs, although intimate in somatic tissues, do not all appear early in embryonic development. In early cleavages, 1-1, 4-4 and 6-6 pairs are usually formed whereas 3-3, 5-5 and possibly even 4-4-5-5 pairs are formed later in cleavage (numbers are idiogram numbers). It appears that the number 2 homologues do not pair. Mutant material of *H. diminuta* was taken from the 9th to 10th generations following irradiation of worms maintained in stock culture. Pairing in mutant worms resembles that in normal specimens except for non-homologous pairing (1-3, 1-5 and 3-1-5 associations being the most common) and formation of terminal loops on chromosomes 1, 2 and 3. Translocations of short segments from chromosomes 3 and 5 to chromosome 1 seems a probable cause for the non-homologous pairing while translocation of short piece to chromosome 1 from its homologue may account for loop formation on strand number 1. M.B-B.

- 1497—DOUGLAS, L. T., 1963. "The development of organ systems in nematotaeniid cestodes. III. Gametogenesis and embryonic development in *Baerietta diana* and *Distoichometra kozloffii*." *Journal of Parasitology*, 49 (4), 530-557.

Distoichometra kozloffii and *Baerietta diana* were studied. Observations were made on material fixed in Duboscq-Brasil, sectioned at 12 μ and stained with Heidenhain's iron haematoxylin. Carnoy fixation followed by the Feulgen technique and Bodian's silver impregnation were also used. Spermatogenesis is similar to that reported in most flatworms, primary spermatocytes occurring in typical syncytial rosettes with 16 nuclei; 32 secondary spermatocytes and 64 spermatids are produced by maturation divisions. In oogenesis different degrees of chromosomal polarization occur in leptot-zygotene; during pachytene the chromatonemata cannot be demonstrated by ordinary microscopical techniques. Chromosomal contraction is resumed after fertilization; prophase and maturation of the uterine oocytes are described in great detail. Cleavage is initially alternate and regular so that 2 macromeres, 2 mesomeres and 2 micromeres are produced. 3 egg-shell membranes are formed; the outer is elaborated by the uterus, the middle is derived from a single macromere and the inner is derived from blastomere material. Possible phylogenetic relationships indicated by the embryological observations are considered. The paper is illustrated with 85 figures. M.B-B.

1869 DUNBAR, R. W. Polytene chromosome preparations from tropical Simuliidae. [Unpublished document.]. WHO/ONCHO/72.95 (1972) 16pp. [En] Dept. of Zoology, Fac. of Science, Univ. of Western Ontario, London, Ontario, Canada.

578—Journal of Parasitology

- †o. DUNN, M. C., 1955.—"Studies on the germ cell cycle of an ochetosomatid trematode. I. Gametogenesis in *Neoreniker*." 41 (6, Sect. 2), 26.

(578o) In *Neoreniker* the diploid chromosome number is 22. Eleven chromosomes appear in both the spermatozoa and ova. In spermatogenesis the cells form a rosette of 32 spermatids. The nuclei form long thin non-flagellate spermatozoa. Primary oocytes are released from the ovary with diffuse postsynaptic nuclei. For final maturation, penetration by a spermatozoon is necessary. R.T.L.

†Abstract of paper presented at the 30th Annual Meeting, American Society of Parasitologists, Atlanta, Georgia, December 27-30, 1955.

536—Dissertation Abstracts.

- p. DUNN, M. C., 1957.—"Studies on the germ cell cycle of *Neoreniker wardi* (Byrd, 1936)." 17 (12), 3132.

(536p) Dunn describes the life-cycle of *Neoreniker wardi*. The miracidium is liberated in the intestine of *Physa gyrina*, penetrates the gut wall and becomes a sacculated mother sporocyst; this gives rise to daughter sporocysts which produce cercariae; these leave the snail and penetrate into various species of frog tadpoles where they encyst. When eaten by snakes the metacercaria excysts in the small intestine and may remain there as long as four weeks. The mature flukes are found in the upper oesophagus and oral cavity. The diploid number of chromosomes is 22, reduction divisions taking place during gametogenesis. Each primary spermatogonium gives rise to 32 spermatozoa; the ovum leaves the ovary before the maturation division and, after penetration by a spermatozoon, two polar bodies are extruded before the male and female pronuclei fuse. Cleavage is unequal, the larger cell giving rise to the somatic tissue of the miracidium and the smaller to the germinal cells. Each germinal cell ultimately divides unequally, the larger cell forming the somatic tissue of the next generation and the smaller, the germinal cells. S.W.

559—DUNN, M. C., 1959. "Studies on the germ cell cycle of *Neoreniker wardi* (Byrd, 1936)." Transactions of the American Microscopical Society, 78 (4), 385-408.

Dunn presents an extensive study of gametogenesis in adult *Neoreniker wardi* and of the development of the miracidium, sporocyst and daughter sporocyst, and cercaria. From the divisions of each primary spermatogonium 32 spermatozoa are produced which appear to be greatly elongated strands of compact chromatin. No associated organelles were demonstrated by the techniques employed. The diploid chromosome number is 22. The developing ovum is released from the ovary just before the maturation divisions and, if fertilized, gives rise to two polar bodies before fusion of the female and male pronuclei. In the larval generations no evidence was found which indicated that the germinal cells arose from the walls of the germinal sacs. All cells of the germinal line originated from the propagatory cell and could be distinguished from cells of the ectodermal line. No structures which could be interpreted as ovaries or testes were apparent in the germinal sacs. The theory of germinal lineage with polyembryony is applicable to *N. wardi*. S.W.

794—Časopis Národního Muzea.

- a. DYK, V., 1954.—"Méně známí paraziti jihomoravských ryb. III." 123 (1), 39-45. [English & Russian summaries pp. 44-45.]

(794a) This third section of the review of little known and recently described parasites of fish from rivers and ponds in South Moravia deals with the occurrence, intensities of infection and some other aspects of *Azygia lucii*, *Proteocephalus torulosus*, *Camallanus truncatus* and *Raphidascaris acus*. A table lists all the parasites found, including 14 helminth and one leech species, giving their size, hosts and pathogenicity. G.I.P.

623—Experimental Cell Research. New York.

- a. FAURÉ-FRÉMIET, E., EBEL, J. P. & COLAS, J., 1954.—“Les inclusions protéiques de l'oocyte de *Parascaris equorum*.” 7 (1), 153-168.

(623a) Fauré-Frémiot *et al.* have made an extensive cytochemical and biochemical study of the so-called hyaline spheres which are found in the cytoplasm of the oocytes of *Parascaris equorum*. They have demonstrated that they are not, as previously believed, composed of mineral salts but consist of protein dissolved or dispersed in a solution of mineral salts. The protein is soluble in alcohol at 60°C., water, physiological saline and acids but is insoluble in 10% sodium chloride, 2M sulphocyanide and concentrated alkalis; there is a high proportion of proline. After fertilization the spheres move to the periphery of the ovum, coalesce and disappear in the periovular fluid, suggesting that they are broken down into substances which are used by the developing embryo. S.W.

- 2083—FAVARD, P., 1959. (École Normale Supérieure, Laboratoire de Botanique et Laboratoire de Synthèse atomique de C.N.R.S., Ivry sur Seine, France.) “L'évolution de l'ergastoplasme dans les spermatides d'*Ascaris*.” Comptes Rendus des Séances de l'Académie des Sciences. Paris, 248 (23), 3344-3346.

Favard has used the electron microscope to study the various stages in the elimination of the cytophore during development of the spermatid in *Parascaris equorum* and this furnishes a good example of the continuous evolution of the ergastoplasma and the ceaseless transformations in its ultrastructure. At the end of the second maturation division it is in the form of an endoplasmic reticulum. When the chromosomes have become settled at the pole to form the spermatid nucleus, the marginal zones of the cytoplasm appear darker than the rest of the cell and the structure of layers and associated grains is then characteristic of organized ergastoplasma. Dispersed in several cortical zones the ergastoplasma develops to form a broad cap in one hemisphere of the cell. There is then a notable change in the surface tensions of the cell in these regions and evidence for this is provided by the appearance of numerous microvillousities on the surface in these, but not on other, parts of the cell. It is finally expelled as a multilobulate mass which detaches itself from the spermatid carrying with it granules of ascaridine. This confirms that the expulsion of the cytophore is more the consequence of physical phenomena than a specific activity of the cell. The cytophore then degenerates. The processes are described in detail and illustrated by photomicrographs. S. Willmott

594—Archives d'Anatomie Microscopique.

- *a. FILHOL, J., 1937.—“Phénomènes cytologiques de la sécrétion d'ascaridine protéine intracellulaire des spermatozoïdes chez l'*Ascaris megalocephala*.” 33, 301-312.

- *1358—FLOYD, A. D.; SWARTZ, F. J., 1969.
“The uterine epithelium of *Ascaris lumbricoides* as a model system for the study of polyploidy.”
Expl Cell Res., 56 (2/3), 275-280.

- 2969—FOOR, W. E., 1970. “Morphological changes of in utero *Dipetalonema vitei* spermatozoa.” [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part I), p. 103.

- 3814—FOOR, W. E.; JOHNSON, M. H.; BEAVER, P. C., 1971. "Morphological changes in the spermatozoa of *Dipetalonema viteae* in utero." *Journal of Parasitology*, 57 (6), 1163-1169. [En] Dept. of Parasitology, Tulane School of Public Health and Tropical Medicine, New Orleans, Louisiana 70112, USA.

Ultrastructural observations on the spermatozoa of *Dipetalonema viteae* in the seminal vesicle of adult male worms and on the changes they undergo in the reproductive tract of adult females are described and illustrated by 5 electronmicrographs. In the seminal vesicle, spermatozoa are non-motile and 1.5 to 2.0 μ in diameter, and about 7.5 μ long. Within 24 hours after deposition in the female tract, they assume a rounded or amoeboid shape and smooth endoplasmic reticulum appears in the cytoplasm. Certain membranous elements, earlier scattered throughout the cytoplasm, shift to the periphery of the cell. By 6 days *in utero*, these elements fuse with the plasma membrane and discharge their electron-dense contents to the outside. Worms inseminated for periods of not more than 48 hours show both fertilized eggs and incompletely altered spermatozoa, so the significance of the morphological changes in spermatozoa remains unknown. J.W.S.

- 980 FOOR, W. E. Origin and possible utilization of small dense granules in oocytes of *Ascaris suum*. *Journal of Parasitology* (1972) 58 (3) 524-538 [En] Dept. of Parasitology, Tulane School of Public Health and Tropical Medicine, New Orleans, Louisiana 70112, USA.

Ultrastructural studies reveal that in the oocytes, but not oogonia, of *Ascaris suum* there are aggregations of dense material closely applied to the external surface of the apical plasma membrane. Tangential sections of the ovary, showing surface views of oocytes, reveal that the dense material is distributed in a net-like arrangement and is comprised of 250 to 300 Å subunits. Where the material is most evident, the apical oolemma of each oocyte is characterized by the presence of numerous infoldings. These membrane invaginations apparently progress until they separate from the plasma membrane. The dense material present in the resultant cytoplasmic vesicles is either incorporated into large inclusions, 4 to 5 μ in diameter, or condensed to form granules 0.2 to 0.3 μ in diameter. The small granules, numerous in the mature oocytes, are not utilized for shell formation but remain apparent in the cytoplasm throughout all stages of embryonic development and, although reduced in number, are still present in the infective-stage larvae where they are confined largely to the cells of the undifferentiated intestine. It is proposed that these granules serve primarily as a structural protein. [AS]. AJ

- 2140—FUKUDA, T., 1961. [Electron microscopical studies on stellate cells of *Ascaris lumbricoides*. I. Structure of stellate cells.] *Journal of the Kumamoto Medical Society*, 35 (9), 889-907. [In Japanese.]

Electron microscopy of the stellate cell of *Ascaris lumbricoides* revealed a giant cell, which was divided into the main body, containing the single large nucleus, branches, smaller branches and end organs. Numerous mitochondria and an endoplasmic reticulum were also noted. In the end organs, a specific spheroid structure of minute fibres was noted and was named the "K-body". Y.Y.

- 2141—FUKUDA, T., 1961. [Electron microscopical studies on stellate cells of *Ascaris lumbricoides*. II. Phagocytosis of the stellate cell.] *Journal of the Kumamoto Medical Society*, 35 (9), 908-912. [In Japanese.]

An isolated stellate cell from *Ascaris lumbricoides* was put into warm physiological saline and fine carbon particles were added; this was kept for 15 minutes. Electron microscopy revealed that carbon particles of less than 0.1 μ diameter were engulfed by the end organs and transported to the centre. The minute fibrous structure of the cell seemed to play some role in transporting the carbon particles, which tended to aggregate during their movement. Y.Y.

843—Verhandlungen der Deutschen Zoologen.

- a. GÖNNERT, R., 1950.—"Zur Frage der Eibildung bei Trematoden (*Bilharzia mansoni*). Year 1949, pp. 132-135.

(843a) Gönner's researches on egg formation in *Schistosoma mansoni* have shown that the form of the ootype alone conditions the form of the egg and that the oocyte is not concerned either with this or with shell-formation. The secretion of the ootype epithelium plays an important part in shell-formation. It is considered that the Mehlis' glands produce a secretion which has a primary lubricating function. These findings for *S. mansoni* have been confirmed in preliminary experiments with *S. japonicum*. A.E.F.

- 1094 GOSWAMI, U. Chromatin elimination in a rare species of nematode *Physaloptera indiana*. [Correspondence]. *Current Science* (1973) 42 (16) 576-577 [En] National Inst. of Oceanography, Miramar, Panaji, Goa, India.

Chromatin elimination during mitosis is described in *Physaloptera indiana* from the stomach of bats in Punjab, India. MTF

333—Comptes Rendus de Séances de la Société de Biologie. Paris.

- b. GOVAERT, J., 1953.—"Sur la teneur en acide désoxyribonucléique du noyau des cellules vitellogènes chez *Fasciola hepatica*." 147 (15/18), 1494-1496.

(333b) Govaert finds that the physiological state of the vitelline cells in *Fasciola hepatica* varies not only in different specimens but in cells in the same transverse sections. While in the glands the cells are in a state of intense activity, shown by the presence of large amounts of deoxyribonucleic acid around the nucleus and the appearance of large granules which fill all up the cytoplasm. These granules are of two kinds, yolky material and shell-forming material. On leaving the glands the metabolic activity of the cells comes to an end and the appearance of the nucleus remains unchanged. Three histograms illustrate the amount of deoxyribonucleic acid in the vitelline cells at different stages. There is considerable evidence of polyploidy in a proportion of the nuclei. S.W.

117—Nature. London.

- d. GOVAERT, J., 1953.—"Deoxyribonucleic acid content of the germinal vesicle of the ovocyte in *Fasciola hepatica*." [Correspondence.] 172 (4372), 302-303.

(117d) The nucleolus of the germinal vesicle in *Fasciola hepatica* is surrounded by nucleolar associated chromatin and a network of extremely thin Feulgen-positive filaments. Their homogeneous distribution permits quantitative valuations of the deoxyribonucleic acid content by Lison's histophotometrical method. Govaert shows that in the germinal vesicle of *Fasciola hepatica* deoxyribonucleic acid not only persists but remains quantitatively constant. R.T.L.

776—Biologisch Jaarboek.

- a. GOVAERT, J., 1954.—"La teneur en acide désoxyribonucléique des noyaux des éléments de la lignée spermatique chez *Fasciola hepatica*." 21, 202-209.

92—Comptes Rendus des Séances de la Société de Biologie. Paris.

- d. GOVAERT, J., 1955.—"Etude quantitative de l'acide désoxypentosenucléique lors de la maturation et de la fécondation de l'oeuf chez *Fasciola hepatica*." 149 (9/10), 1066-1069.

(92d) At metaphase of the first maturation division in *Fasciola hepatica* the primary oocyte contains twice the theoretical diploid amount of deoxypentosenucléic acid. The first polar body and the secondary oocyte contain the diploid amount and the second polar body and, initially, the male and female pronuclei the haploid amount. On the other hand in some sections, eggs contained pronuclei with the diploid amount of deoxypentosenucléic acid. There appears to be a slow but simultaneous synthesis of deoxypentosenucléic acid in the two pronuclei in order to build up the amount necessary for the nuclei of the first two blastomeres. No trace of segmentation was observed in the flukes examined. S.W.

637—Biologisch Jaarboek.

- a. GOVAERT, J., 1956.—"Quelques remarques sur la fécondation et la maturation de l'oeuf de *Fasciola hepatica*." 23, 140-144.

1903—GOVAERT, J., 1957. [Université de Gand, Laboratoire d'Anatomie humaine et d'Anatomie comparée, Ghent, Belgium.] "Etude quantitative de la teneur en acide désoxyribonucléique des noyaux des cellules somatiques et germinatives chez *Fasciola hepatica*." *Archives de Biologie*, 68 (2), 165-200.

Govaert studied the DNA content of the germinal and somatic cells of *Fasciola hepatica* by histophotometry after Feulgen staining. The DNA content of the young primary spermatocytes undergoes considerable augmentation to more than double the diploid quantity. Further development is accompanied by progressive loss, the spermatid containing only the haploid quantity and this remains unchanged in the mature spermatozoid and young male pronucleus. Measurements of DNA content during oogenesis were technically difficult but the young primary oocyte contained more than the 4n value of DNA. The quantities of DNA in the germinative vesicles was of the same order as in the young oocyte nuclei. The first polar body appears to have a diploid DNA content and the second polar body and female pronucleus haploid values. Simultaneous synthesis of DNA occurs in the two pronuclei bringing them from haploid to diploid quantities of DNA and the amount of DNA necessary for the nuclei of the first two blastomeres is prepared. The nuclei of the somatic tissues (gut epithelium and connective tissue) possess the diploid quantity of DNA. In the vitelline cells the quantities of DNA vary distinctly with the metabolic activity of the cells. When metabolism is fairly low the cells fall into two clearly defined groups—one with tetraploid quantities of DNA and the other with octoploid. When metabolic activity is high the nuclei contain extremely variable amounts of DNA.

S. Willmott

560—GOVAERT, J., 1960. "Étude cytologique et cytochimique des cellules de la lignée germinative chez *Fasciola hepatica*." *Experimental Parasitology*, New York, 9 (2), 141-158.

Govaert presents a detailed cytological and cytochemical study of the germinal and vitelline cells of *Fasciola hepatica*. In the primary spermatocytes there was a synthesis of DNA but the values obtained did not correspond to a simple multiple of that in the spermatids. It is concluded that the DNA content of each chromosome can vary. In the oocytes detectable proteins did not appear in the nucleoplasm and a considerable portion of the superficial cytoplasm was eliminated. In contrast in the vitelline cells the nucleoplasm contained large amounts of proteins. DNA was present in the germinal vesicle in much the same proportion as in the young oocytes. At the time of fertilization the spermatozoon showed RNA in its cytoplasm; it was not possible to demonstrate if this was a true synthesis or an extraction from the cytoplasm of the ovum. During maturation divisions of the ovum the DNA was divided uniformly between the various bodies formed although the DNA values of the two polar bodies was less than the theoretical value. The two pronuclei undergo a preprophase synthesis of DNA, building up the amount required for the two diploid nuclei resulting from the first segmentation division. The DNA content of the vitelline cells is directly dependent on their state of physiological activity.

S.W.

1092—GRESSON, R. A. R., 1957. [Department of Zoology, Queen's University, Belfast, Northern Ireland, U.K.] "Spermatocytosis in *Fasciola hepatica*." *Quarterly Journal of Microscopical Science*, 98 (4), 493-498.

The stages of spermatocytosis in *Fasciola hepatica* were studied on live tissue under phase contrast microscopy and on smears fixed in Bouin's picro-formol and in Flemming without acetic, and also by the Feulgen technique. The nucleus of the late spermatid undergoes elongation and grows out from the distal end of the cell. The flagellum arises from an extension of cytoplasm and appears to be made up of an axial filament surrounded for its greater or entire length by a thin sheath of cytoplasm. The spermatozoon becomes free of the greater part of the cytoplasm of the spermatid and consists of a nucleus and a flagellum. The head is conical and uniform in diameter except anteriorly, and a middle piece, comparable to that of a typical flagellate sperm, is absent.

G. I. Pozniak

267—Parasitology.

- c. GRESSON, R. A. R., 1958.—"The ontogeny of the digenetic trematode *Sphaerostoma bramae* (Müller) Lühe." 48 (3/4), 293-307.

(267c) Gresson has found the diploid chromosome number in *Sphaerostoma bramae* to be 24. Spermatogenesis mainly follows the usual pattern of digenetic trematodes. No centrosome could be detected in the spermatozoon which is nuclear and cytoplasmic in origin. The fine structure of the tail could not be determined. The Golgi elements appear, in Kolatchev preparations, as short rods and filaments; these are eliminated from the spermatid in the residual cytoplasm. Mitochondria were visible in spermatogonia, spermatocytes and spermatids, those of the spermatid remaining in the residual cytoplasm. The mature ovary is normally completely filled with primary oocytes with nuclei either in the resting condition or in early prophase of the first meiotic division; short rod-like Golgi bodies are present and granular and rod-shaped mitochondria are concentrated in a single mass at one pole or two masses at opposite sides of the nucleus, although a few may be scattered throughout the cytoplasm. Nuclear material appears to be passed from the oocyte nucleus into the cytoplasm.

S.W.

- 2143—GRESSON, R. A. R., 1962. "The membrane system of the oocyte of *Fasciola hepatica* L." *Experimental Cell Research*. New York, 26 (1), 212-216.

The endoplasmic reticulum of the oocytes of *Fasciola hepatica* consists of a membranous network permeating the cytoplasm. It is interpreted as being devoid of ribosomes, i.e. an agranular endoplasmic reticulum. Continuity of these endoplasmic reticulum membranes with the plasma-lemma is demonstrated and continuity with the nuclear envelope is probable. This appears to be the first report of such simultaneous continuities in animal tissues although they have been shown in plant cells.

K.A.W.

- 2861—GRESSON, R. A. R., 1962. "Spermatogenesis of a cestode." [Correspondence.] *Nature*. London, 194 (4826), 397-398.

Spermatogenesis in *Proteocephalus pollanicola* resembles that of trematodes. The ripe spermatozoon is thread-like, with a Feulgen-positive nucleus and a long flagellum. Electron micrography revealed electron-dense material in the nuclei of the spermatozoa and that the flagellum possessed an axial filament consisting of two central fibrils surrounded by nine double peripheral fibrils. Details of the structure are given and illustrated by two electron micrographs. At a certain stage in spermiocytosis the axial filament becomes coiled or twisted within the external sheath of the tail.

S.W.

- 1350—GRESSON, R. A. R., 1964. "Oogenesis in the hermaphroditic Digenea (Trematoda)." *Parasitology*, 54 (3), 409-421.

Recent research on the extra-nuclear components of oögonia and oocytes and the changes that these cells undergo during oögenesis in hermaphrodite Digenea is reviewed. In most species, the early prophase stages of the first maturation division are present before the oocyte leaves the ovary and the sperm enters the ooplasm when the egg is within the uterus. In the few species in which all the phases of the first meiotic division are believed to take place after the oocyte has left the ovary, it is possible that early prophase nuclei have been overlooked. Knowledge of the correlation between the phases of meiosis and the time of entry of the sperm is scanty. In hermaphrodite Digenea the diploid number of chromosomes is 28 for one species, 12 for several species and 22 for most species; comparatively few have less than 16. There is no evidence of polyploidy within the Digenea. 57 references are cited.

H.H.W.

- 2144—GRESSON, R. A. R., 1964. "Electron microscopy of the ovary of *Fasciola hepatica*." *Quarterly Journal of Microscopical Science*, 105 (2), 213-218.

The ultrastructure of oogonia and oocytes of *Fasciola hepatica* is described. The ovary wall is interpreted as a "membrane-like structure" devoid of nuclei. Mitochondria in the oogonium are usually concentrated on one side of the nucleus or are divided into 2 groups on either side of the nucleus. The distribution of osmiophilic bodies in some nuclei is taken as evidence that these nuclei, and nuclei of some oocytes, are in early prophase stage of division. Processes apparently arise from the surface of the oogonia and lie within the inter-cellular space. Further evidence supports an earlier claim that the endoplasmic reticulum, nuclear envelope and plasmalemma form a continuous membrane system. The extent of the granular endoplasmic reticulum increases in oocytes over its rather limited extent in the oogonium. No Golgi apparatus could be identified. The results are compared with observations of other workers.

K.A.W.

- 2145—GRESSON, R. A. R. & PERRY, M. M., 1961. "Electron microscope studies of spermatocytosis in *Fasciola hepatica* L." *Experimental Cell Research*, New York, 22, 1-8.

A brief description of the ultrastructure of the secondary spermatocyte, spermatids and spermatozoa of *Fasciola hepatica* is given. 4 stages of spermatid development are recognized during which the cell is transformed from an irregular polyhedral to an elongate shape. The authors conclude that a flagellum is present, although the typical ultrastructure of a flagellum is not clearly shown. Neither the Golgi system nor mitochondria participate in the formation of the flagellum.

K.A.W.

- 2357—GRESSON, R. A. R. & THREADGOLD, L. T., 1959. "A light and electron microscope study of the epithelial cells of the gut of *Fasciola hepatica* L." *Journal of Biophysical and Biochemical Cytology*, 6 (2), 157-162.

For electron microscopy of the gut of *Fasciola hepatica*, living flukes were dissected in 1% osmium tetroxide buffered with veronal to a pH of 7.4. Small pieces containing parts of the intestine were quickly transferred to tubes containing 1% osmium tetroxide and were then embedded in a mixture of 85% *n*-butyl and 15% methyl methacrylate with 1% benzoyl peroxide as a catalyst. Polymerization was carried out at 60°C. For light microscopy, material was fixed in Bouin's picroformal and cut at 5 and 7.5 μ for staining with iron haematoxylin and eosin or light green. Photomicrographs demonstrate, for the first time, the structure of the protoplasmic absorptive processes of the gut cells. Similar processes have not been described for the cells of any other animal. The processes are often in the form of tubular loops with both ends attached to the same cell and in many cases the free end of a process was flattened and ribbon-like. When a cell becomes glandular in function the protoplasmic processes seem to become less numerous. Near the lumen of the gut, and where 2 tall cells are in contact, there are bands of dense amorphous cytoplasmic material associated with the plasma membrane. These bands do not appear to be connected morphologically with the protoplasmic absorptive processes. [See also Helm. Abs., 31, No. 683.]

H.H.W.

163—Transactions of the American Microscopical Society.

c. GUILFORD, H. G., 1955.—"Gametogenesis in *Heronimus chelydrae* MacCallum." 74 (2), 182-190.

(163c) Guilford has found that spermatogenesis in *Heronimus chelydrae* follows the same pattern as in other monoecious trematodes. There are three mitotic divisions followed by the two maturation divisions resulting in clusters of 32 spermatids; the nucleus of each spermatid condenses to form a spermatozoon and this leaves the cytoplasm which degenerates. The haploid chromosome number in the spermatozoon is consistently 10. The process of oogenesis is similar; the sperm nucleus enters the oocyte in the oviduct and condensation of the bivalent chromosomes occurs later. Two polar bodies are formed. The metaphase of the first cleavage division occurs immediately after the breakdown of the pronuclear membranes and two cells, unequal in size, are formed. Successive divisions of these two cells result in the formation of a miracidium while the egg is in the uterus S.W.

2142—GUILFORD, H. G., 1961. "Gametogenesis, egg-capsule formation, and early miracidial development in the digenetic trematode *Halipegus eccentricus* Thomas." *Journal of Parasitology*, 47 (5), 757-764.

The spermatogenesis, oogenesis, capsule formation and early miracidial development of *Halipegus eccentricus* are described. The haploid chromosome number is 11 and the diploid number 22. The egg capsule is formed from globules in the vitelline cells. Glycogen is present in fully developed vitelline cells and spermatozoa. The differentiation of the somatic cells in the miracidium is similar to that in other trematodes. D.A.E.

963 GUPTA, N. K.; GREWAL, S. S. Morphology, anatomy, histology and chromosome number of *Cotugnia meggitti* Yamaguti (1935) - a cestode from *Columba livia intermedia*. *Research Bulletin of the Punjab University* (1971) 22 (1/2) 221-228 [En] Dept. of Zoology, Panjab Univ., Chandigarh, India.

The morphology and histology of the various organ systems of *Cotugnia meggitti* from *Columba livia intermedia* at Chandigarh, India, are described and illustrated. The haploid chromosome number is 10. MRNS

2090—GUSTAFSSON, M. K. S., 1968. "Effect of colchicine on DNA synthesis in plerocercoids of *Diphyllbothrium dendriticum* (Cestoda)." *Expl Cell Res.*, 50 (1), 1-8.

The effect of colchicine on cell division in plerocercoids of *Diphyllbothrium latum* from *Coregonus lavaretus* was investigated using a microphotometric, and an autoradiographic method, after incubation in an 0.1% solution for 4 or 8 hours, or 10 hours, respectively. During incubation, the cell population in the S phase decreased considerably, indicating that cells were prevented from entering this phase. Plerocercoids incubated for 10 hours were unable to incorporate ^3H -thymidine (i.e. to synthesize DNA). Colchicine did not influence the entry of cells into the G2 phase and not arrested cells in metaphase. The colchicine-induced inhibitory effect on the early stage of the S phase is discussed. [A.S.] A.J.

9—HALTON, D. W., DERMOTT, E. & MORRIS, G. P., 1968. "Electron microscope studies of *Dictidophora merlangi* (Monogenea: Polyopisthocotylea). I. Ultrastructure of the apical epithelium." *J. Parasit.*, 54 (5), 909-916. The apical epithelium of the intestinal caeca of *Dictidophora merlangi* contains 2 cell types; haematin-containing cells characterized by numerous vacuoles in a heterogeneous dense contents considered to be haematin, and intervening and partially overlapping, small connecting cells. The luminal surface of haematin cells bears lamellar folds projecting into the lumen in which haematin clumps are also identified. Vesicles occur in the apical cytoplasm. Cells of the epithelium are joined to each other and to underlying parenchyma cells by septate desmosomes. These observations credit earlier concepts of a deciduous epithelium related to elimination of haematin derived from blood feeding by sloughing of haematin-laden cells. It is suggested that a cycle of activity may occur in haematin cells with concentration of haematin in vesicles, and its release into the intestinal lumen followed by further haemoglobin uptake, perhaps by pinocytosis. [9 electron photomicrographs.] K.A.W.

10—HARADA, R.; MAEDA, T.; TAKASHIMA, A.; SADAKATA, Y.; ANDO, M.; YONAMINE, K.; OTSUJI, Y.; SATO, H., 1970. "Electronmicroscopical studies on the mechanism of oogenesis and fertilization in *Dirofilaria immitis*." In: Sasa, M. [Editor], "Recent advances in researches on filariasis and schistosomiasis in Japan." Tokyo: University of Tokyo Press, pp. 99-121. Ultrastructural studies have been made of oogenesis and fertilization in *Dirofilaria immitis*. The structure of the oviduct, maturing cells of the ovary, oögonia, oocytes and ova are described in detail and illustrated. Fertilization is described. Sperms in the seminal receptacle are polymorphic. The fertilized ovum at the blastula stage becomes implanted in placental substance in the endometrium. Each microfilaria in the uterine cavity is enveloped in a saw-toothed cuticular layer of double membrane structure and a tonofilamentous structure in contact with the cuticular layer was not observed. A.J.

11—HARLEY, J. P. & GALLICCHIO, V., 1970. "*Trichinella spiralis*: intracellular spheroid bodies in 'migratory' larva." *Trans. Am. microsc. Soc.*, 89 (4), 497-498. Intracellular spheroid bodies are described for the first time in migratory larvae of *Trichinella spiralis* recovered from abdominal fluid of rats 6 to 14 days after infection. The bodies measured one to 2 μ in diameter and were found 5 to 8 μ from the posterior end of the body in undifferentiated cells. The larvae, which were alive and motile, contained from 8 to 20 bodies. No bodies were found in larvae from other sites, encysted larvae or newly deposited larvae. A.J.

5154—HARLOW, D. R. & BYRAM, J. E., 1971. "Isolation and morphology of the mitochondrion of the cestode, *Hymenolepis diminuta*." *J. Parasit.*, 57 (3), 559-565.

A mitochondrial fraction was isolated from the homogenate of whole *Hymenolepis diminuta*. The mitochondria of this fraction are the most primitive metazoan mitochondria isolated to date. In addition, these mitochondria occur in an environment of low oxygen availability and therefore of particular interest. In morphology, *H.* mitochondria are distinct both in cristae arrangement and in size. [A.S.] A.J.

2852—HECHLER, H. C. & TAYLOR, D. P., 1966. "The life histories of *Seinura celeris*, *S. oliveirae*, *S. oxura*, and *S. steineri* (Nematoda: Aphelenchoididae)." *Proc. helminth. Soc. Wash.*, 33 (1), 71-83.

The development of 4 species of *Seinura* feeding on *Aphelenchus avenae* in petri dish culture at 28°C. was studied. 20, to less than one in 10,000 *S. steineri* adults were males and the others were protandrous hermaphrodites. Spermatocytes and oocytes had 6 pairs of chromosomes. About 100 sperm cells developed during the final moult after which eggs were produced at 2-hourly intervals until the supply of sperm cells was exhausted. First-stage larvae lacked stylets and valve plates in the metacarpus and moulted within the egg. Development to hatching of 2nd-stage larvae took 44 to 48 hours. Newly hatched larvae had delicate stylets but did not feed before the 2nd moult. 3rd and 4th-stage larvae and adults had heavier stylets and fed. The complete life-cycle took about 6 days. *S. oxura* differed from *S. steineri* in that males were more numerous (0 to 45% of adults), hermaphrodites produced about 115 sperm cells, 2nd-stage larvae moulted within the egg and the complete life-cycle took about half the time. *S. celeris* reproduced bisexually, males making up 15 to 40% of the adult population. Germ cells contained 3/4 pairs of chromosomes. Females may have more than 250 sperm cells in the reproductive tract at any one time and lay eggs every 1.5 hours. The first-stage larvae have a delicate stylet and valve and moult within the egg. The 2nd-stage larvae have heavier stylets and valves, hatch and, like all later stages, feed. Only 3 moults were seen. The complete life-cycle took 2.5 days. The life-cycle of *S. oliveirae* is very similar to that of *S. celeris*. D.W.L.

2358—HINZ, E., 1959. "Elektronenmikroskopische Untersuchungen an Muskelzellen von *Parascaris equorum* Goetz." *Zeitschrift für Zellforschung und Mikroskopische Anatomie*, 49 (3), 339-343.

Hinz describes and illustrates the detailed structure of muscle cells of *Parascaris equorum* as seen by electron microscopy. He confirms the presence of myofibrils but was unable to see any glycogen granules in the contractile part of the spindle as reported by Hartmann [in *Allgemeine Biologie*, 1953, 4th edit., Stuttgart]. G.I.P.

720—HINZ, E., 1963. "Elektronenmikroskopische Untersuchungen an *Parascaris equorum* (Gutsegment, Isolationsgewebe, Muskulatur und Nerven)." *Protoplasma*, 56 (2), 202-241.

Hinz has made a thorough electron microscope study of the cuticle, subcuticle, isolation tissue, muscle cells, ventral nerve and the nerve-muscle connection of *Parascaris equorum* and records his observations, illustrating them by 17 electron micrographs and 4 diagrams. G.I.P.

723—HIRSCHMANN, H. & TRIA, L. Y.-LLOU, A. C., 1962. "Oögenesis and protoduction in *Heterodera glycines* and *H. trifolii*." [Abstract of paper presented at the 53rd Annual Meeting of the American Phytopathological Society, 1961.] *Phytopathology*, 52 (1), 13.

Observations were made on the oocyte divisions and maturation in the fourth-stage and fourth moult of *Heterodera glycines* and *H. trifolii*. *H. trifolii* appeared to be triploid and reproduced parthenogenetically whilst *H. glycines* was diploid and cross-fertilization was necessary. J.W.

3020—HOSSAIN, M. M., 1964. "Effects of massive doses of gamma radiation (120,000r) on the chromosomes of successive generations of *Hymenolepis diminuta*." *Dissertation Abstracts*, 24 (8), 3063-3064.

Eight successive generations of *Hymenolepis diminuta* were γ -irradiated at the cysticeroid stage in *Tribolium confusum* with 15,000r. to give a cumulative dose of 120,000r. Meiotic and mitotic chromosomes in aceto-orcein squashes of descendants of these irradiated worms were studied. On the basis of differences in chromosome lengths and structure in irradiated worms as compared with controls, 4 different cytological strains produced by the cumulative effects of irradiation are recognized. Variations in chromosome number above and below the diploid number of 12, and a few dicentrics and metacentrics were also observed in irradiated worms. J.W.S.

539—HOSSAIN, M. M. & JONES, A. W., 1963. "The chromosomes of *Hymenolepis microstoma* (Dujardin 1845)." *Journal of Parasitology*, 49 (2), 305-307.

In *Hymenolepis microstoma*, the diploid number of chromosomes in Feulgen-stained squash preparations of germ cells and early embryos is 12. There are 4 pairs of small (2 to 3 μ), one pair of medium (4 μ) and one pair of large (5 μ) chromosomes. The unequal size of the members of the largest pair in some cells is discussed. There appear to be heterochromatic arcs near the terminal centromeres. Meiosis in the oocytes and mitosis and cleavage in the early embryos are briefly described. J.W.S.

1187—Bulletin de la Société Zoologique de France.

a. HURLAUX, R., 1943.—"La cytologie des cellules 'phagocytaires' de l'ascaride (*Parascaris equorum*)." 67 (6), 188-193.

368—HOVASSE, R., 1959. "Étude au microscope électronique des phénomènes cytoplasmiques de la spermatogénèse chez l'Ascaris (*Parascaris equorum*)." International Congress of Zoology (15th) London, July 16-23, 1958. Proceedings, pp. 708-709. [Discussion p. 709.]

Hovasse discusses spermatogenesis in *Parascaris equorum* as revealed by electron microscopy. He also describes the relative positions of the spermatocyte nucleus, the ascaridine granules and the chondriosomes. Mitochondria do not seem to play any role in spermatogenesis. Their structure is very dense and abnormal. The Golgi bodies consist of a large number of saccular dictyosomes, which are associated with the ascaridine granules. N. Jones

534—Journal of the Faculty of Science, Hokkaido Imperial University. Series VI. Zoology.

- a. IKEDA, K. & MAKINO, S., 1936.—"On the sex and chromosomes of the oriental human blood fluke, *Schistosoma japonicum* Katsurada." 5 (1), 57-71.

(534a) The chromosome complex of *Schistosoma japonicum* is 16 chromosomes of which two pairs are atelomitic V-shaped and six pairs are telomitic rod-shaped showing intergrading size. Male and female cercariae could not be distinguished morphologically. The causes of the predominance of unisexual parasitism in the intermediate host and of the failure of males and females to mature in the definitive host in cases of unisexual infection are discussed. R.T.L.

- 2941—IPATEVA, G. V., 1969. [Certain observations on the process of egg formation and shedding in Mermithidae.] *Mater. nauch. Konf. vses. Obshch. Gel'mint.*, Year 1969, Part II, pp. 222-226. [In Russian.]

- 1833—IRWIN, S., 1970. "An electron microscope study of Mehlis' gland and egg shell formation in *Fasciola hepatica*." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part 2), p. 430.

- 3817—ISHIKAWA, M., 1971. [Histochemical and electron microscopic studies on the oesophageal wall of the pig *Ascaris (Ascaris suis)*.] [40th Ann. Meeting J.S.P., Tokyo, 1971. Abstract.] *Japanese Journal of Parasitology*, 20 (4), 275-276. [Ja]

- 1059—IWASAKI, H., 1960. [Department of Pathology, Osaka Medical College, Takatsuki, Osaka, Japan.] [Studies on the development of *Gigantobilharzia sturniae* (Tanabe, 1948). 3. Egg development of *G. sturniae* (Tanabe, 1948).] *Japanese Journal of Parasitology*, 9 (5), 569-576. [In Japanese: English summary p. 595.]

Iwasaki studied the embryology and cytology of the miracidia of *Gigantobilharzia sturniae*. The apical gland cell was differentiated at the end of the morula stage and showed a strong PAS-positive reaction. Y. Yamao

410—Japanese Journal of Medical Science and Biology. [Cont. of Japanese Medical Journal.]

- d. IZUMI, S., 1952.—"Biological studies on *Ascaris* eggs. III. Appearance and decline of nucleic acid, fat and glycogen in consequence of *Ascaris* oögenesis." 5 (1), 45-51.

1490—Japanese Journal of Medical Science and Biology.

- *a. IZUMI, S., 1953.—"Biological studies on *Ascaris* eggs. IV. *Ascaris* ontogenesis observed by nucleic acid stainings, and distribution of fat or glycogen following the development of *Ascaris* eggs." 6 (4), 371-383.

1490—Japanese Journal of Medical Science and Biology.

- *b. IZUMI, S., 1953.—"Biological studies on *Ascaris* eggs. V. On the staining reactions of *Ascaris* eggs to phosphor, calcium and some other substances in the process of their ontogenesis." 6 (4), 385-388.

217—Proceedings of the Helminthological Society of Washington.

- i. JACOBS, L. & CHITWOOD, B. G., 1937.—“A preliminary note on ‘rhabditin’ sphaero-crystalloids.” 4 (2), p. 60.

(217i) Jacobs & Chitwood have investigated the sphaero-crystalloids or bi-refringents which occur in the intestinal cells of species of *Rhabditis*. They come to the conclusion that they are of carbo-hydrate character since they are apparently digested or disintegrated by the action of saliva. T.G.

- 1141—JAMES, B. L., BOWERS, E. A. & RICHARDS, J. G., 1966. “The ultrastructure of the daughter sporocyst of *Cercaria bucephalopsis haimaena* Lacaze-Duthiers, 1854 (Digenea: Bucephalidae) from the edible cockle, *Cardium edule* L.” *Parasitology*, 56 (4), 753–762.

The body-wall of the daughter sporocyst of *Cercaria bucephalopsis haimaena* consists of an external syncytial tegument, lying on a basement membrane, and an internal cellular subtegument which surrounds a body cavity containing developing cercariae. The syncytial tegument has areas of dense cytoplasm alternating with sparse reticulate cytoplasm. The dense cytoplasm contains nuclei, a few mitochondria and secretory products which probably include a neutral mucopolysaccharide. This may be the precursor of the acid mucopolysaccharide in the sparse reticulate cytoplasm and on the surface of the daughter sporocyst. Nutrients are probably absorbed through the outer plasma membrane of the tegument, pass through the sparse reticulate cytoplasm in the middle region of the tegument, the inner plasma membrane and basement membrane into the subtegument.

[A.S.] A.W.P.

- 0001—JAMUAR, M. P., 1966. “Studies of the sperm of *Nippostrongylus brasiliensis*.” *J. Cell Biol.* 5, 1–11.

Development of the sperm of *Nippostrongylus brasiliensis* is described from light and electron microscopy. The spermatid initially has a high nucleus/cytoplasm ratio with free cytoplasmic ribosomes but no organized Golgi apparatus or endoplasmic reticulum. “Mitochondrion-like inclusions” which enclose a crystalloid composed of hexagonally packed rods appear and become peripherally oriented in the broad portion of the sperm, apparently attached to the membrane. Few normal mitochondria occur. The inclusions stain with Janus Green B, Altman's stain and the nitro-2T succinic dehydrogenase reaction, and are PAS-positive. 2 centrioles occur in developing spermatids. Nuclear material loses its membrane, becomes filamentous and oriented longitudinally, and is ultimately spirally twisted. Elongation of the nuclear material produces the thin Feulgen-positive portion of the sperm. Microtubules extend from the nuclear core into the broad portion of the sperm. Thus, neither flagellum nor acrosome occur. The structure and motility of the sperm is compared to that of *Ascaris* and some other invertebrate sperms.

K.A.W.

1201—JAMUAR, M. P., 1966. "Electron microscope studies on the body wall of the nematode *Nippostrongylus brasiliensis*." *J. Parasit.*, 52 (2), 209-232.

The cuticle of adult *Nippostrongylus brasiliensis* has about 14 prominent longitudinal ridges. The cortex is homogeneous and bounded on the outer side by a 3-layered membrane. The matrix is amorphous, weakly PAS-positive and contains transverse bands of dense, strongly PAS-positive material 1 to 2 μ apart and clusters of protein fibres with a periodicity of 54 μ . The fibre layer of the cuticle consists of 3 layers: an outer series of transverse bundles probably of collagen and 2 inner layers arranged obliquely at an angle of 130° to one another. The hypodermis is highly basophilic. Each cell of the muscle layer has a distal fibrillar zone containing the myofilaments and a proximal protoplasmic zone containing large branching mitochondria and the nucleus. Prominent, electron dense, keel-like structures extend from the peripheral sarcolemma into the main body of the cell dividing its distal surface longitudinally into 5 to 8 lobes. Each keel-like structure overlaps the adjacent keel in a shingle-like fashion which could provide contact for impulse propagation and allow the sliding of non-contractile elements during contraction. Myofilaments appear to be of 2 types, 9 μ and 24 μ in diameter. The protoplasmic zone is rich in glycogen. In filariform larvae of *N. brasiliensis* only, the cortex and the matrix were observed in the cuticle. The cortex is bordered by a membrane and is homogeneous in appearance. The matrix is amorphous and contains transverse bands. The inner layer of the matrix is modified into a crystalloid structure showing regularly spaced parallel lines 180 Å apart in the longitudinal and 270 Å apart in the transverse plane. The muscle layer is similar to that of the adult.

T.Y.

528—Cellule.

- a. JEFFREY, E. C. & HAERTL, E. J., 1938.—"The nature of certain so-called sex chromosomes in *Ascaris*." 47 (2), 237-244.

1832—JIA, R. K.; SMYTH, J. D., 1971. "Ultra-structure of the rostellar tegument of *Echinococcus granulosus* with special reference to biogenesis of mitochondria." *Int. J. Parasit.*, 1 (2), 169-177. [In] Dept. of Zoology, Australian National University, Canberra.

On the rostellum of *Echinococcus granulosus*, the tegumental microtriches are long, thin and often branched, hooked, barbed or curved providing firmer adhesion to the host gut and increasing the absorptive area. Mitochondria are almost absent from the rostellar tegument in a freshly evaginated protoscolex, although dumb-bell shaped membranous structures are present. After 24-28 hours culture *in vitro*, the latter disappeared and active mitochondrial biogenesis was seen to occur. The occurrence of this process during the early phases of the protoscolex-strobila transformation may be triggered by transfer from the environment of a tissue site (in the

intermediate host) to that of an intestinal site (in the dog) and presumably results in a switch in metabolism. This phenomenon also appears to be associated with the "secretory" activity in the nuclei of the rostellar gland cells. In an established and growing strobilate phase of *Echinococcus*, mitochondria are abundant at all levels of the distal cytoplasm. This and the occurrence of concentric mitochondria suggest a higher metabolic activity in this region than in other parts of the worm. Elongated mitochondria with longitudinal cristae, restricted only to the rostellar tegument, were also found. In addition, unusual membrane-bound mitochondrial sacs containing numerous mitochondria were present. Some sacs opened to the outer surface, displaying mitochondria apparently in the process of extrusion. Extrusion of mitochondria would explain the frequent occurrence of free intact mitochondria on the surface of the distal cytoplasm—a phenomenon possibly related to membrane digestion believed to occur in this region. Lamellar bodies of unknown function were also found, often in the distal cytoplasm. "Secretion droplets" which appeared externally on the rostellum of specimens cultured *in vitro* were found to be bubble-like outgrowths of distal cytoplasm containing vesicles, mitochondria and vacuoles of varying sizes.

[P.L.S., A.J.]

131—Quarterly Journal of Microscopical Science.

- a. JOHN, B., 1953.—"The behaviour of the nucleus during spermatogenesis in *Fasciola hepatica*." 94 (1), 41–55.

(131a) John describes and illustrates in detail the behaviour of the nuclei in the male germ cells in *Fasciola hepatica* during all stages of spermatogenesis. He records the occurrence of globules, of which he was unable to determine the origin, composition or function, in the peripheral border of the testes and notes that similar structures were described by Dingler in *Dicrocoelium lanceatum* [*dendriticum*]. The diploid chromosome number appears to be 12. Chiasmata show a normal distribution. S.W.

† Abstract of paper presented at 1st National Conference on Trichinosis, Chicago, December 15, 1952.

2084—JOHN, B., 1957. [Department of Zoology & Comparative Anatomy, University College of South Wales and Monmouthshire, Cardiff, Wales.] "The chromosomes of zooparasites. I. *Acanthocephalus ranae* (Acanthocephala: Echinorhynchidae)." *Chromosoma*, Berlin, 8 (7), 730–738.
John studied the chromosomes of *Acanthocephalus ranae* in squash preparations stained with acetic orcein, and reports eight metacentric mitotic chromosomes, of which two are medio-centric (= sex chromosomes), homozygous female and heterozygous male. Egg meiosis is initiated by the sperm nucleus, the contribution of which may produce variations in the pattern of egg maturation. W. G. Inglis

2085—JOHN, B., 1957. [Department of Zoology & Comparative Anatomy, University College of South Wales and Monmouthshire, Cardiff, Wales.] "The chromosomes of zooparasites. II. *Oswaldocruzia filiformis* (Nematoda: Trichostrongylidae)." *Chromosoma*, Berlin, 9 (1), 61–68.
John studied the chromosomes of *Oswaldocruzia filiformis* and *Oswaldocruzia* sp. in the diploid complement with, in addition, a sex (X) univalent in the male and two such chromosomes in the female. The segregation of the unpaired X is variable which suggests that the XO system is of recent origin. The meiotic centromere may divide before the first anaphase and the nuclei of the gonadal epithelium are endopolyploid, originating by endo-mitosis. W. G. Inglis

123—Journal of Parasitology.

- f. JONES, A. W., 1945.—"Studies in cestode cytology." 31 (4), 213-235.

(123f) Jones shows that morphologically, ecologically and cytologically the Hymenolepididae show great uniformity while the Dilepididae are diverse. An examination of the chromosomes of members of the Hymenolepididae shows the number to be either 10 or 12. *Protygnella blarinae*, *Diorchis reynoldsi*, *Hymenolepis fraterna* and *Diorchis ralli* have 10, while *H. anthocephalus*, *H. diminuta*, *Aploparaksis* sp., *H. serpentulus sturni* and *H. serpentulus turdi* have 12, though an aberrant specimen of *H. anthocephalus* gave a variety of chromosome counts. Among the Dilepididae the chromosome count varied and may be 10, 12, 14 or 16. *Rhabdometra similis* has 12 and they are very small. *Anonchotaenia globata* also has 12, while an unidentified species of *Anonchotaenia*, which can be distinguished by an unusual development of the embryo, has 16. *Liga brasiliensis* has 14 and a species of *Choanotaenia* has 16, of which 14 bear a close resemblance to those of *Liga*. P.A.C.

115—Journal of the Tennessee Academy of Science.

- d. JONES, A. W., 1951.—"The chromosomes of *Davainea proglottina*." [Abstract of paper presented at the 60th Annual Meeting of the Tennessee Academy of Science, Johnson City, Tenn., December 8 & 9, 1950.] 26 (2), 150.

(115d) *Davainea proglottina* has a diploid chromosome number of 18 which is the highest yet reported for cestodes. There are one pair of large, two pairs of medium large, five pairs of medium small and one pair of very small chromosomes. R.T.L.

291—Transactions of the American Microscopical Society.

- d. JONES, A. W., 1951.—"The chromosomes of *Davainea proglottina*." 70 (3), 272-273.

(291d) Jones describes the chromosomes of *Davainea proglottina*. All appear to be acrocentric and the diploid chromosome number is 18, which is higher than in most cestodes previously studied. The meiotic stages in spermatocytes and oocytes are similar and in no way exceptional. Chiasma frequencies, although not worked out appear to be low. S.W.

451—Journal of the Tennessee Academy of Science.

- b. JONES, A. W., 1956.—"The chromosomes of a species of *Halipegus* Looss, 1899 (Digenæa: Hemiuridae)." 31 (3), 186-187.

(451b) Jones has examined the chromosomes of a species of *Halipegus* (probably *H. occidentalis*). The diploid number was 18, with three larger and six smaller pairs; the smallest were less than 1μ long and the largest 3μ long. Meiosis in male and female gametocytes appeared to be normal. During cleavage the macromeres retained the characteristic "yolk granules" of the ovum. S.W.

2993—JONES, A. W., 1970. "Genetic and evolutionary stability of cestodes; inferences from data on radiation and cytology." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part 2), pp. 432-433.

105—Journal of Parasitology

- j. JONES, A. W. & CIORDIA, H., 1956.—"The chromosomes of *Hydatigera taeniaeformis* and *Taenia pisiformis*." 42 (2), 207.

(105j) Jones & Ciordia have studied the chromosomes of *Hydatigera taeniaeformis* and *Taenia pisiformis* using Schreller's Feulgen-fast-carmin method. Those of *H. taeniaeformis* number 16 diploid and range in size from 1μ to about 2μ while those of *T. pisiformis* number 20 diploid and are somewhat larger. S.W.

713—Journal of the Tennessee Academy of Science.

†a. JONES, A. W. & MAYER, T. C., 1952.—“The chromosomes of *Spirorchis magnitestis* Byrd (Digenea: Spirorchidae).” 27 (3), 197.

(713a) The chromosomes of *Spirorchis magnitestis* are relatively large and appear to consist of two groups, four pairs being considerably larger than the other five. The diploid number appears to be 18. All the centromeres are subterminal.

R.T.L.

579—Journal of the Tennessee Academy of Science.

b. JONES, A. W. & MAYER, T. C., 1953.—“The chromosomes of *Spirorchis magnitestis* Byrd (Trematoda, Digenea).” 28 (4), 301-304.

(579b) In the chromosomes of *Spirorchis magnitestis* there are one pair of metacentrics, three pairs of long acrocentrics, one pair of medium acrocentrics and four pairs of small acrocentrics. At mitotic metaphase in the spermatogonia, the longest chromosomes are about 5μ - 6μ and the shortest about 1μ in length. At prometaphase, the chromosomes are somewhat longer with distinct centromeres. Spermatogenesis involves three, rarely four, spermatogonial divisions. These divide into eight primary spermatocytes which undergo meiosis. Chiasmata at diplotene or diakinesis showed that at least one chiasma is formed by each pair; there is never more than one chiasma per bivalent in the shorter chromosomes; up to four may form in the longer chromosomes, but there are usually two. In the metacentric chromosome, the chiasmata are invariably two. Pachytene chromosomes of the oocyte show chromomeric banding which on further study may serve to identify specific chromosomes or regions.

R.T.L.

220—Journal of Parasitology.

†n. JONES, A. W. & WARD, H. L., 1945.—“The application of cytological techniques to cestodes and other helminth material.” 31, Suppl. p. 16.

(220n) Chromosomes of cestodes, trematodes and Acanthocephala can be studied either in sections or in smear preparations. A number of stains are suitable for demonstrating them.

P.A.C.

24—Journal of Parasitology.

v. JONES, A. W. & WYANT, K. D., 1957.—“The chromosomes of *Taeniarhynchus saginatus* (= *Taenia saginata*) Goeze, 1782.” 43 (1), 115-116.

(24v) Sections of proglottides of *Taenia saginata* and aceto-orcein squash preparations of dissected testes and parts of the uterus were examined for chromosomes. Only oocytes and young embryos gave clear pictures of mitosis and meiosis: the diploid chromosome number appeared to be 20. After reduction division there appeared to be four large V-shaped, three small V-shaped and two (possibly three) large J-shaped chromosomes ranging in size from 3μ to 5μ . The developing embryophore of older embryos contained many polyploid nuclei.

S.W.

3024—JOYON, L. & COLLIN, J. P., 1962.

“Ultrastructure de la membrane cellulaire de l'intestin d'*Ascaris* du cheval (*Parascaris equorum* Goeze).” *Comptes Rendus des Séances de la Société de Biologie*. Paris, 156 (4), 651-654.

The cells of the cellular membrane of the intestine of *Parascaris equorum* may attain 150μ in height and 10μ in breadth. Details of their ultrastructure are described and illustrated by a line drawing and 7 electronmicrographs. The border of each cell carries a narrow band of microvilli supported by fibrillar axes embedded in the cytoplasm which is particularly prominent in the apical region, several microns thick. There are also a number of very complex desmosomes and the basal surface is much augmented by being greatly folded. S.W.

1904—KAMEL, S. H., 1961. "Toxicological study of two new drugs used in the treatment of sheep fascioliasis." *Veterinary Medical Journal*. Giza, Year 1960-61, 7 (7/8), 259-273.

The toxicity of two new fasciolicides for sheep was determined by comparing the blood picture, at intervals, before and after treatment of normal healthy ewes. Sheep dosed orally with a suspension in water of "Hoechst preparation 19260" at a dose rate of 150 mg. per kg. body-weight showed no toxic symptoms during 19 days' post-treatment observation; this drug is said to be a tasteless, odourless and fat-soluble powder containing 85% [by weight?] of a chlorinated hydrocarbon as the active principle. Sheep injected subcutaneously behind the shoulder with 0.4 ml. per kg. of Ecobol showed blood changes indicative of slight liver and kidney disorder which was, however, transitory and disappeared within 48 hours; this drug is said to be an emulsion with carbon tetrachloride as the active principle. Sheep dosed with Ecobol also showed signs of excitation and restlessness due to irritation at the site of injection but no inflammatory reaction was seen. J.W.S.

4320—KANWAR, U. & ANAND, R., 1971.

"Sperm cytoplasmic remnants in the nematode *Ascaridia galli*." *J. Parasit.*, 57 (1), 193.

Residual cytoplasmic sperm bodies, rich in lipids, proteins and RNA, are described in *Ascaridia galli*. They are formed during spermatogenesis, move to the testicular tubule, and are phagocytosed by the epithelial cells of the tubule wall. The function of these bodies is discussed. A.J.

*922—KAULENAS, M. S. & FAIRBAIRN, D.,

1968. "RNA metabolism of fertilized *Ascaris lumbricoides* eggs during uterine development." *Expl Cell Res.*, 52 (1), 233-251.

3818—KAZACOS, K.; MACKIEWICZ, J. S.,

1972. "Spermatogenesis in *Hunterella nodulosa* Mackiewicz and McCrae, 1962 (Cestoidea: Caryophyllidae)." *Zeitschrift für Parasitenkunde*, 38 (1), 21-31. [En] State Univ. of New York, Albany, New York 12203, USA.

Spermatogenesis of *Hunterella nodulosa* from *Catostomus commersonii* in the USA was studied from sections and squashes. Primary spermatogonia under a series of mitotic divisions resulting in successive linked clusters of 2 secondary, 4 tertiary and 8 quaternary spermatogonia. Succeeding divisions produce 16 primary spermatocytes with nuclei at the periphery of a syncytial mass. 32 secondary spermatocytes are formed by the first maturation division. A 2nd maturation division produces 64 spherical spermatids, still connected to the central syncytium, which mature into spermatozoa. This follows the usual pattern for Cyclophyllidae and Pseudophyllidae. A.J.

683—KESSEL, R. G. ET AL., 1961. "Cytological studies on the intestinal epithelial cells of *Ascaris lumbricoides* suum." *Transactions of the American Microscopical Society*, 80 (1), 103-118.

Kessel *et al.* have studied the intestinal epithelial cells of *Ascaris lumbricoides* of the pig by means of light microscopy, electron microscopy and cytochemistry and compare their observations with the conflicting observations of other authors. A large number of cylindrical protoplasmic projections in the form of microvilli, which are sometimes branched, comprise the lumen surface of each cell. The inner core of each microvillus appears to consist of a meshwork of fine filaments which extend into the apical cytoplasm of the cell where they are continuous with a system of fine filaments forming the terminal web. Blebs of the apical plasma membrane are seen occasionally which are thought to be a manifestation of a secretory process. Specializations of the plasma membrane (desmosomes) occur in the apical region of the cells beneath which are sometimes found interdigitations of the plasma membrane with associated intercellular spaces. The plasma membrane of the basal portion of the cells, which is often deeply infolded, is in contact with a dense basal lamella. The endoplasmic reticulum appears in the form of parallel membranes occasionally expanded into cisternae. Mitochondria are studded with microsome. Lipid droplets are numerous and pleomorphic. Polysaccharides are found in the microvilli, the basal lamella and throughout the cell especially in the central half. The greatest concentration of glycogen and lipid occurs in the central half. The basal lamella, microvilli, plasma capsule and various regions of the cytoplasm colour intensely with Mazia's protein stain. DNA is found exclusively in the nucleus; apart from that in the cytoplasm one or two nucleoli in each nucleus contain RNA. Alkaline phosphatase could not be demonstrated in the cells. The paper is illustrated by 13 photomicrographs and one schematic diagram. There are 35 references. J.W.S.

6002—KHALIL, G. M., 1968. "Germinal development in *Philophthalmus megalurus* (Cort, 1914) (Trematoda: Digenea)." *Diss. Abstr.*, 29 (3), 880.

30—Journal of Experimental Zoölogy.

- a. KING, R. L. & BEAMS, H. W., 1938.—"An experimental study of chromatin diminution in ascaris." 77 (3), 425-538.

246—Journal of Parasitology

- m. KISNER, R. L., 1957.—"The chromosomes of *Hymenolepis diminuta*." 43 (4), 494-495.

(246m) Kisner figures the late prophase, metaphase and early anaphase stages in the chromosomes of *Hymenolepis diminuta* and confirms that 12 is the normal number of chromosomes, as reported by Jones.

R.T.L.

1905—KLESOV, M. D., POPOVA, Z. G. & KORZH, K. P., 1960. [Further studies on the epizootiology, prophylaxis and treatment of dicercocliasis of sheep.] *Nauchnie Trudi. Ukrainski Nauchno-Issledovatelski Institut Eksperimentalnoi Veterinariii*, 26, 131-138. [In Ukrainian.]

A 15% solution of chlorophos destroyed ants and was used against dicercocliasis in sheep. Doses of 30 to 50 gm., given to four sheep, killed up to 95.6% of the parasites but the sheep also died. Two doses of 15 gm. each were more effective than three similar doses. Treatment of six sheep with 6 gm. of hexachloroethane, followed after seven days by 1 ml. of carbon tetrachloride with an equal quantity of liquid paraffin was ineffective.

N.J.

2550—KMETEC, E., MILLER, J. H. & SWARTZWELDER, J. C., 1962. "Isolation and structure of mitochondria from *Ascaris lumbricoides* muscle." *Experimental Parasitology*, New York, 12 (3), 184-191.

The mitochondria in an essentially anaerobic helminth, *Ascaris lumbricoides* var. *suus*, were investigated. Using an electron microscope, particles of approximately 0.33 μ were observed, mainly in the central cytoplasmic region of muscle cells. The presence of tubular cristae which probably originate at the limiting membrane suggests that the particles are mitochondria. No lamellar cristae or double outer membranes, typical of mitochondria described from higher organisms, were observed. The small number of cristae may be related to the essentially anaerobic type of metabolism characteristic of *Ascaris*. Various attempts to obtain mitochondrial particles of *Ascaris* muscle in cell-free preparations are described.

M.B-B.

432—Acta Japonica Medicinae Tropicalis.

- b. KOBAYASI, H., 1939.—"Supplementary study regarding the organisation of *Microfilaria bancrofti*." 1 (2), 193-202.

(432b) Kobayasi has used a modified Giemsa stain for the study of the primordial cell groups of the embryos of *Filaria bancrofti*. He finds that the genital 'anlage' has no relationship with the G cells.

R.T.L.

2853—KOCHHAR, D. M., 1961. "Histochemical studies in the oogenesis and fertilization of the nematode *Porrocaecum angusticolle* (parasite in vulture)." Research Bulletin of the Panjab University of Science, Hoshiarpur, 11 (3/4), 207-219.

The ovaries of *Porrocaecum angusticolle*, from the intestine of the vulture, were dissected in physiological saline and studied histochemically; the techniques used are tabulated. The results are discussed and figured under the following headings: mitochondria, phospholipid bodies, lipid yolk, glycogen, hyaline spheres and egg envelope.

H.H.W.

1906—KONRAD, J. & RUMANOVSKÝ, K., 1962. "Trichostrongylus axei u kořálových zvířat." [Trichostrongylus axei in endoparasity u kořálových zvířat.] Zpr. Československé Veterinární Věd. Veterinární Medicina, 33 (1), 249-260. [German & Russian summary, pp. 259-260.]

Phenothiazine was given to 68 foxes in doses of 0.25 to 1.5 gm. per kg. body-weight. A dose of 0.25 gm. per kg. given each day in the food for four days, gave the greatest reduction in egg counts, reducing ascarids by 77.2%, hookworms by 69.1% and trichurids by 37.8%. Thiabendazole was given in the food to 25 foxes as a single dose of 0.15 gm. per kg., as two doses of 0.1 gm. per kg. 48 hours apart, or as three daily doses of 0.1 gm. per kg. for three consecutive days. The egg counts of ascarids were reduced by 94.2 to 100%, of hookworms by 47.6 to 55.2% and of trichurids by 36.3 to 40.3%.

N.J.

1034—KOROLEVA, Y. I., 1968. [Karyological study of some species of the monogenean genus *Diplozoon*.] Dokl. Akad. Nauk SSSR, 179 (3), 739-741. [In Russian.]

The karyotype of 4 species of *Diplozoon* was studied. *D. homoion*, *D. pavlovskii* and *D. gussevi* showed no striking differences. The diploid number of chromosomes was 14 and they measured 5 to 8 μ , 4 to 8 μ and 3 to 5 μ in length respectively for the 3 species. There were 2 pairs of long, 4 pairs of median and one pair of short chromosomes. The distribution at metaphase was radial. The diploid number for *D. paradoxum* was 8, 2 pairs of chromosomes about 13 μ , one pair about 9 μ and one 4 μ .

G.I.P.

2314—KOROLEVA, Yu. I., 1968. [New data on karyology of *Diplozoon*.] Parazitologiya, 2 (4), 294-296. [In Russian: English summary p. 296.]

The diploid number of chromosomes of *Diplozoon gussevi*, *D. homoion*, *D. pavlovskii*, *D. nipponicum* and *D. megan* is 14. *D. paradoxum* has 8 chromosomes. The meiosis in the spermatogenesis of these 6 species is discussed and the illustrations of the chromosomes are given.

J.A.D.

G266—KOSTYUK, N. A., 1967. [Cell inclusions in plant nematodes.] Trudy gel'mint. Lab., 18, 34-46. [In Russian.]

1935—KOZEK, W. J., 1970. "Ultrastructure of the microfilaria of *Dirofilaria immitis*." [Abstract.] J. Parasit., 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part I), pp. 192-193.

- a. LAMS, H., 1952.—"Étude morphologique du cycle de l'oeuf d'*Ascaris megalocephala* au cours de la fécondation." 14 (1/2), 141-167. [English & German summaries pp. 164-166.]

2987—LARROUY, G., RUFFIE, J. & MALASPINA, L., 1965. "Étude cytogénétique du caryotype de *Dicrocoelium dendriticum* (Trématode Digénien)." *C.r. hebdomadaire des Séances de l'Académie des Sciences, Paris*, 260 (11), 3156-3159.

The karyotype of *Dicrocoelium dendriticum* was studied in free parenchymatous cells on a culture medium currently used for the study of human blood cells. The normal diploid number of chromosomes was found to be 18, not 20 as previously believed, and 9 pairs are figured, briefly described and illustrated by 2 photomicrographs. As well as haploid cells, tetraploid and even hexaploid cells were present in the culture.

D.W.L.

2943—LEE, D. L., 1965. "The cuticle of adult *Nippostrongylus brasiliensis*." *Parasitology*, 55 (1), 173-181.

The cuticle of *Nippostrongylus brasiliensis* consists of an outer triple-layered membrane, a single cortical layer, a fluid-filled layer traversed by collagen fibres, struts (supporting 14 longitudinal ridges) suspended by collagen fibres in the fluid-filled layer, 2 triple-layered fibre layers and a basement lamella. The fluid-filled layer has haemoglobin and esterase. Muscles are attached to the lamella or fibre layers. Hypodermal mitochondria have the usual appearance. Longitudinal ridges may abrade microvilli.

R.C.A.

2904—LEE, D. L., 1970. "The structure and development of the spermatozoon of *Heterakis gallinarum*." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part I), p. 202.

5157—LEE, D. L., 1971. "The structure and development of the spermatozoon of *Heterakis gallinarum* (Nematoda)." *J. Zool., Lond.*, 164 (2), 181-187.

The structure and development of the spermatozoon of *Heterakis gallinae* is described. The spermatozoon is amoeboid. The centrioles have the unusual structure of 9 single fibres. The nucleus has no limiting membrane and is surrounded by mitochondria and organelles termed alpha bodies. These alpha bodies appear to arise from Golgi complexes in association with granular endoplasmic reticulum in the spermatocytes and have a fibrillar component which is released into the peripheral cytoplasm of the spermatid when the spermatozoon is formed. There is no refringent cone as in other ascaroid spermatozoa. [A.S.] A.J.

1828—LEE, D. L. & ANYA, A. O., 1968. "Studies on the movement, the cytology and the associated micro-organisms of the intestine of *Aspiculuris tetraptera* (Nematoda)." *J. Zool., Lond.*, 156 (1), 9-14.

The intestine of *Aspiculuris tetraptera* undergoes periodic contractions which suggest that muscles are associated with it. Ultrastructural examination of intestinal sections showed that the intestinal cells are similar to those of other nematodes but with a network of muscle fibres around the intestine. There are many virus-like particles in the epithelial cells, and yeast-like micro-organisms in the lumen are attached to the apical surface of the epithelial cells replacing some microvilli. The part played by the muscle network during digestion and defaecation is discussed. 7 electron photomicrographs are included. [A.S.] C.W.G.

5158—LEE, D. L. & LEŠTAN, P., 1971. "Oogenesis and egg shell formation in *Heterakis gallinarum* (Nematoda)." *J. Zool., Lond.*, 164 (2), 189-196.

Egg-shell formation and the structure of the developing ova of *Heterakis gallinae* are described. The oogonia are small, undifferentiated cells which are arranged around a central cytoplasmic rachis. The oogonia and young oocytes are in cytoplasmic continuity with the rachis and it is suggested that the rachis may influence synchronous development of the oocytes. The oocytes contain 2 types of granule; refringent, which give rise to the ascaroside layer of the egg-shell, and another kind which appear to be a type of yolk for the developing egg. After fertilization, the spermatozoon produces numerous ribosomes; a second unit membrane appears beneath the oolemma, and the chitinous layer of the shell forms between the oolemma and this inner membrane. The refringent granules later produce the ascaroside layer of the shell between the chitinous layer and the inner membrane. The outermost layer of the shell is produced from material secreted by the cells of the uterus.

[A.S.] A.J.

4766—LEE, C. C. & MILLER, J. H., 1969. "Fine structure of the intestinal epithelium of *Dirofilaria immitis* and changes occurring after vermifugal treatment with caparsolate sodium." *J. Parasit.*, 55 (5), 1035-1045.

The cytology of normal intestinal cells of *Dirofilaria immitis* is described and found to resemble that of *Ancylostoma caninum* but with a smaller complement of mitochondria. Intestinal cells of worms recovered from dogs treated with caparsolate sodium showed a decrease in number of multilaminar pigment bodies, a change in their morphology, and distortion of the luminal microvillous border. Microvilli were irregular in shape and orientation. It is suggested that pigment bodies may be lysosomes and represent ingested haemoglobin products. The arsenical vermicide caparsolate sodium is thought to act on the luminal surface of the intestinal epithelium, interfering with normal nutritional processes.

K.A.W.

19—Chromosoma. Berlin & Heidelberg.

a. LIN, T. P., 1954.—"The chromosomal cycle in *Parascaris equorum* (*Ascaris megalocephala*): oogenesis and diminution." 6 (3), 175-198.

(19a) Lin presents a detailed, illustrated account of oogenesis in *Parascaris equorum*. The ends of each collective chromosome are heterochromatic and devoid of spindle fibres; the middle part is euchromatic. During the early stages of meiosis the heterochromatic regions unite to form a huge chromocentre and the euchromatic parts are almost indistinguishable, the term "aligner ring" being used. During strepsinema and diakinesis the chromosomes divide into four parts into the eight heterochromatic ends of the four chromatids and the ring opens into a tetrad. The heterochromatic ends are excluded from the telophase nucleus so that there is no heterochromatin in somatic nuclei. S.W.

244—Proceedings of the Leeds Philosophical Society. Scientific Section.

a. LLOYD, L., 1945.—"Demonstration of nuclear division in Nematoda." 4 (4), 251-258.

1439—LO, C. T., 1969. "Chromosomes of *Fasciolopsis buski* (Trematode: Fasciolidae)." *Bull. Inst. Zool., Acad. Sinica* 14: 1-5.

Mitotic chromosomes of *Fasciolopsis buski* were studied using aceto-iron squash preparations made from cercarial embryos which were obtained from experimentally-infected snails, *Segmentina hemisphaerula*. There were 14 (= 2n) chromosomes consisting of 7 homologous pairs. Chromosomes fixed in Carnoy's solution were shorter than those fixed in Newcomer's fluid; the anaphase chromosomes observed were more condensed than the metaphase chromosomes. At metaphase, the average total lengths of 14 chromosomes were 65.9 μ (Carnoy's) and 86.0 μ (Newcomer's). The average lengths of each homologue were 7.1, 6.3, 6.1, 5.4, 4.7, 4.4 and 3.7 μ . The arm-length ratios in order of diminishing length of 7 homologues were 1:1.3, 1:1.6, 1:1.3, 1:1.8, 1:1.3, 1:1.1 and 1:3.2. The use of karyotype analysis for taxonomic and phylogenic studies is briefly discussed. [A.S.] P.S.G.

667—LÖSER, E., 1965. "Die Eibildung bei Cestoden." *Z. Parasitenk.* 66: 556-580.

On the basis of the structure of the "oogenotop" [see *Helminth. Abstr.*, 35, No. 3052] and relevant egg types, Löser divides the cestodes into 4 groups: (1) Cestodaria, Pseudophyllidea, Tetrarhynchidea, Tetraphyllidea; (2) Taeniidae; (3) Thysanosomeinae; (4) most Cyclophyllidea. The form of the egg in each group is related to the structural organization of the reproductive systems. H.D.C.

675—Dokladi Akademii Nauk SSSR.

- a. LOGACHEV, E. D., 1952.—[Development of testes and role of living substance in the process of spermatogenesis in cestodes.] 85 (1), 245-247. [In Russian.]

(675a) Logachev in his cytological study describes the structure and development of the testes and spermatozoa in *Railletina urogalli*. C.R.

675—Dokladi Akademii Nauk SSSR.

- d. LOGACHEV, E. D., 1952.—[Development of the vitellarium and yolk sac formation in tapeworms.] 85 (5), 1197-1199. [In Russian.]

(675d) Logachev reports on the development of vitelline glands and the formation of yolk globules in *Railletina urogalli* and *Taenia saginata*. He concludes that the vitelline glands originate from the basophilic mesodermal parenchyme elements. In this primary layer the nuclei dissolve and protoplasmatic globules of living matter are formed. Inside these globules there appear fine granules, by fusion of which large yolk globules are formed. The basophilic staining reaction of yolk globules gradually disappears; with the age of the proglottis they become oxyphilic, so that the yolk gland of an adult proglottis is completely filled with oxyphilic yolk globules. C.R.

26—Dokladi Akademii Nauk SSSR.

- c. LOGACHEV, E. D., 1953.—[Development of oocytes and importance of yolk nuclei in *Railletina urogalli* Modcr.] 88 (1), 181-184. [In Russian.]

(26c) Logachev, in this cytological study of the ovary of *Railletina urogalli*, discusses the development and importance of yolk nuclei from fatty substances. C.R.

199—Dokladi Akademii Nauk SSSR.

- a. LOGACHEV, E. D., 1953.—[The origin and tissue character of the cuticular formations in cestodes.] 89 (5), 965-967. [In Russian.]

(199a) From his cytological study of the origin and structure of uterus epithelium in *Diphyllobothrium latum* Logachev comes to the conclusion that this epithelium seems to originate from non-nucleated parenchyma material. C.R.

527—Dokladi Akademii Nauk SSSR.

- e. LOGACHEV, E. D., 1953.—[The localization of thymo-nucleonic acid in the parenchyma of cestodes in connection with the process of cell development.] 91 (3), 643-645. [In Russian.]

(527c) Logachev, from a study of the cytology of *Taenia saginata*, concludes that granules of thymo-nucleonic acid appear in the subcuticular layer as a result of the assimilation, from the intestine of the host, of the products of broken down nucleoproteids. These granules come together and eventually fuse, forming dense nucleonic regions which swell and, in the deeper parts of the parenchyma, form the origin of the "naked nucleus" of the pre-cell stage. A thin membrane of cytoplasm appears around the naked nucleus and the cell is formed.

C.R.

619—Dokladi Akademii Nauk SSSR.

- a. LOGACHEV, E. D., 1954.—[Development of dorso-ventral contractile fibres in cestodes.] 95 (6), 1363-1366. [In Russian.]

619—Dokladi Akademii Nauk SSSR.

- k. LOGACHEV, E. D., 1954.—[Structure and histogenesis of yolk glands in the broad tapeworm.] 99 (1), 181-184. [In Russian.]

(619k) Logachev has studied, by staining and serial sectioning, the formation and structure of the yolk glands of *Diphylllobothrium latum*. Basophilic amoebocytes migrate from the subcuticular layer to lie under it where they divide and grow to form the gland. Differentiation into ripe yolk cells involves the formation of vacuoles in the cytoplasmic periphery of the cells and a decrease in cytoplasmic basophilia, while the nucleus becomes compact and stains more deeply and the amount of thymo-nucleonic acid progressively increases. The formed gland contains various cell stages but mainly the ripe yolk cells "secreted" by it.

G.I.P.

981—Zhurnal Obshchei Biologii.

- a. LOGACHEV, E. D., 1955.—[The development and formation of male sex cells in cestodes.] 16 (4), 291-297. [In Russian.]

(981a) The development of the male cells of *Diphylllobothrium latum*, which Logachev describes and illustrates, differs from that in higher animals in that primary spermatogonia divide to give rise to rather small secondary spermatogonia which unite into a multinucleate mass termed by the author spermatogonial symplast. On further development of the symplast, elongated nuclei give rise to the spermatozooids while other nuclei undergo degeneration.

G.I.P.

2058—LOGACHEV, E. D., 1956. [Kemerovskii gosudarstvennyi meditsinskiy institut, U.S.S.R.] [The tropic function of the intestinal epithelium in trematodes.] Dokladi Akademii Nauk SSSR, 131 (3), 709-712. [In Russian.]

Logachev reports on his studies of the dynamics of the morphological changes in different parts of the intestinal epithelium of mature *Fasciola hepatica* during digestion. He describes the structure of the wall of the median part of the intestine and of the epithelium of the main tube and the lateral branches. These epithelia are both composed of a single cellular layer. There are no contractile fibres in the principal part of the intestine. In the intestinal sections containing food, the cytoplasm of the epithelial cells is clearly differentiated into basal basophil containing food, the cytoplasm of the epithelial cells is clearly differentiated into basal basophil and apical oxyphilous parts. The nucleus is always localized in the basophil part of the cell. The author gives further cytological details and illustrates the paper with photomicrographs.

N. Jones

2866—LOGACHEV, E. D., 1961. [Morphology of the embryonal development of *Moniezia expansa*.] Conference on the Natural Focal Occurrence of Diseases and Problems in Parasitology of Kazakhstan and Central Asian Republics (4th), Alma-Ata, 1959, Part 3, pp. 317-321. [In Russian.]

Logachev describes the early embryonic development of *Moniezia expansa*. Primary segmentation of the egg cell is said to be anisotropic. The spermatozoid does not fuse with the nucleus of the ovum but is assimilated in the cytoplasm of the egg cell. The formation of the embryo represents a process transitional in character between sexual reproduction and parthenogenesis. Mitotic division of the small nuclei taking place in the multinucleate symplastic embryo finally gives rise to the oncosphere. DNA accumulates in the nuclei as the embryo develops.

G.I.P. /

- 4324—LOGACHEV, E. D. & BAZITOV, A. A., 1967. [Cytological study of neurones of trematodes.] *Dokl. II nauch. Konf. Kafedry Biol. Kemerov. gosud. med. Inst.* [Conference on theoretical and practical problems in parasitology.] *Kemerovo*, pp. 26-27. [In Russian.]

Phase contrast microscopy was used to study the cytology of neurones in and around the oral sucker in *Fasciola hepatica*. 4 types of neurones are described: (i) fibrillar; (ii) gigantic vacuolarized; (iii) neurones intermediate between the first 2 types; and (iv) granular. According to the terminology of Gresson & Threadgold [see *Helminth. Abstr.*, 35, No. 2151], these 4 types should be named, respectively, α , β , γ and δ -neurones. G.I.P.

- 4325—LOGACHEV, E. D., BOVT, V. D., BOGDANOV, V. R. & RESHETNIKOVA, L. V., 1970. [The structure and development of the early embryo of cyclophyllidean cestodes.] *Voprosy Biologii. Mater. nauch. Konf. biol. Kafedr.* June 1970. *Kemerovo: Kemerovski Pedagogicheski Institut*, pp. 8-10. [In Russian.]

The authors have studied the early development of *Dipylidium caninum* and conclude that the pro-oncosphere is a multinucleate symplast with 3 types of nuclei: (i) small nuclei rich in chromatin, (ii) medium-sized nuclei and (iii) nuclei intermediate in structure between the first and 2nd type. During further development, the 2nd and 3rd type nuclei enlarge by amitosis. Consequently, the term "division" cannot be applied to the early development of cyclophyllideans. G.I.P.

- 4323—LOSEVA, N. G., 1965. [Fine structure of the gastro-intestinal tract of some nematodes (*Soboliphyme baturini* and *Trichuris suis*) and the presence there of DNA and RNA.] *Trudy gel'mint. Lab.*, 15, 112-119. [In Russian.]

253—Journal of Morphology.

- a. LOWRY, O. P., JENNIS, H. W. & G. R. L., 1961. "The fibrillae of the uterine cells of *Ascaris equorum* (variety univalens)." 68 (3), 585-592.

(253a) The fibrillae of the uterine cells of *Ascaris equorum* which arise out of the basement membrane and cover the epithelial cells with a basket-like network are believed to serve as supporting structures for these large epithelial cells. R.T.L.

- 1075—LUKASHENKO, N. P., 1968. "Comparative biologic and pathologic studies of *Alveococcus multilocularis*." *Archs envir. Hlth*, 17 (4), 676-680.

Differences between types of *Echinococcus multilocularis* were manifested by unequal susceptibility of mice to infection by oncospheres from various regions of the USSR. These differences were only observed in the first 3 to 5 intraperitoneal passages through laboratory animals. Using germinative vesicles of *E. multilocularis* from experimentally-infected *Sigmodon hispidus* and *Lagurus lagurus*, the diploid number of chromosomes was found to be 18. All were acrocentric rod-shaped or slightly arched and measured 0.9 to 1.4 μ . The development of larval cysts in man, rodents and ungulates is discussed. Atypical development of cysts in cattle, sheep and swine suggests that they are not suitable hosts and play practically no role in the epidemiology of alveolar hydatid disease of man. C.W.G.

- 1233—LUKASHENKO, N. P., BRZHESKI, V. V. & SMIRNOVA, Z. M., 1965. [Study of the chromosomes of *Echinococcus multilocularis* Leuckart, 1863. Preliminary note.] *Medskaya Parazit.*, 34 (3), 351-352. [In Russian.]

The germinal layer and larval scoleces of *Echinococcus multilocularis* [see also *Helminth. Abstr.*, 35, No. 697] were examined for chromosomes. The diploid number of chromosomes is 18 and their length is not more than 1 to 1.2 μ . G.I.P.

- 2988—LUMSDEN, R. D., 1965. "Cytological studies on the absorptive surfaces of cestodes." *Diss. Abstr.*, 26 (5), 2933.

- 1554—LUMSDEN, R. D., 1966. "Fine structure of the medullary parenchymal cells of a trypanorhynch cestode, *Lacistorhynchus tenuis* (v. Beneden, 1858), with emphasis on specializations for glycogen metabolism." *J. Parasit.*, 52 (3), 417-427.

The following features suggest that the medullary parenchymal cells of *Lacistorhynchus tenuis* are important in carbohydrate metabolism: large quantities of glycogen in the α or rosette configuration, local elaborations of the agranular endoplasmic reticulum in association with the glycogen deposits, and relatively large and moderately numerous mitochondria. The Golgi apparatus and granular endoplasmic reticulum are not extensively developed in this cell type. T.Y.

- 3160—LUMSDEN, R. D., 1967. "The fine structure of mitochondria in a cestode, *Lacistorhynchus tenuis* (v. Beneden, 1858)." *J. Parasit.*, 53 (1), 65-77.

The distribution and fine structure of mitochondria in the strobilar tissues of *Lacistorhynchus tenuis* were studied by electron microscopy. Mitochondria are most numerous in the integument and medullary parenchymal cells. Those of the latter are often quite large (up to 5 μ in length) and usually contain longer and more numerous cristae than the mitochondria in most other cell types. The relative internal membrane surface area of mitochondria in the integument and musculature is generally significantly less than that typically encountered in aerobic tissues. In view of the environment of the parasite and the morphology, tissue, and intracellular distribution of its mitochondria, it is suggested that the mitochondria of *L. tenuis* carry out reactions which may be independent of aerobic respiration. [A.S.] M.B-B.

- 1096 LUMSDEN, R. D. Cytological studies on the absorptive surfaces of cestodes. VI. Cytochemical evaluation of electrostatic charge. *Journal of Parasitology* (1972) 58 (2) 229-234 [En] Dept. of Biology, Tulane Univ., New Orleans, Louisiana 70118, USA.

Absorption of acid anionic and cationic colloidal iron, H^3 -polyamino-acids, and Ca^{45} to the tegument plasmalemma of *Hymenolepis diminuta* was examined by electron microscopy, radioassay and autoradiography. Observations are consistent with the presence of a relatively high electronegative charge density at the outer surface of the membrane, which appears capable of repelling anionic materials of high molecular weight. Possible micro-environmental implications include the exclusion of potentially deleterious organic materials of like charge and the concentration of physiologically important inorganic counter-ions proximal to the parasite's surface. [AS]. AJ

2999—MAEDA, T. ET AL., 1970. "Studies on the fine structures of generative cells and the fertilization mechanism in *Dirofilaria immitis*." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part I), pp. 223-224.

1361—MAEDA, T.; HARADA, R.; NAKASHIMA, A.; SADAKATA, Y.; ANDO, M.; YONAMINE, K.; OTSUJI, Y.; SATO, H., 1970. "Electronmicroscopic studies on spermatogenesis in *Dirofilaria immitis*." In: Sasa, M. [Editor], "Recent advances in researches on filariasis and schistosomiasis in Japan." Tokyo: University of Tokyo Press, pp. 73-97.

The ultrastructure of spermatogenesis in *Dirofilaria immitis* has been studied. The structures of the spermatogonium, primary spermatocyte and spermatid are described in detail and illustrated. Spermatids are initially spindle-shaped and later become amoeboid. At prophase of maturation division, ovoid bodies each surrounded by a saccate membrane appear around the chromosomes. Their function is unknown. The mature spermatozoon is amoeboid, no centrioles have been located but mitochondria and ovoid bodies have been found near the plasma membrane. The lining cells in the proliferative zone of the testis are small and simple in structure. Those in the growth zone are larger, containing many lipid droplets. It has been confirmed that a part of each lining cell separates to become a nutritive cell in the lumen of the testis.

A.J.

213—Izvestiya Akademii Nauk SSSR. Seriya Biologicheskaya.

- a. MAKAROV, P. V., 1953.—[Cytology of fertilization in *Parascaris equorum*.] Year 1953, No. 1, pp. 46-58. [In Russian.]

569—Zhurnal Obshchei Biologii.

- a. MAKAROV, P. V., 1956.—[Investigation of gametogenesis in the horse ascaris in conjunction with the problem of reduction division.] 17 (3), 185-201. [In Russian.]

(369a) Makarov describes and illustrates the various stages in spermatogenesis and oogenesis in *Parascaris equorum* using both results from his own study of stained sections of the genital tracts and observations already recorded in the literature. He also describes the changes in the ribonucleic acid content during division and the differences in the maturation divisions in the univalens and bivalens races of *P. equorum*. G.I.P.

113—Doklady Akademii Nauk SSSR.

- b. MAKAROV, P. V., 1958.—[The distribution of polysaccharides in the course of gametogenesis, fertilization and egg cleavage in *Parascaris equorum*.] 120 (2), 412-414. [In Russian.]

(113b) Polysaccharides first appeared in the young oocytes of *Parascaris equorum* when these reached the prismatic shape, the amount increasing with the growth of the cells, but were absent from all stages in the development of the spermatozoa. On fertilization the polysaccharide content decreased, but soon after the first maturation division, remained constant in early prophase and reached a maximum during metaphase, when the stain in the cytoplasm deepened but any accumulation in the spindle and centrosome was absent. The distribution of polysaccharides within the cells is described.

724—MAKAROV, P. V., 1958. [Cytological and cytochemical studies on the development of *Parascaris equorum* eggs.] *Zhurnal Obshchei Biologii*, 19 (5), 338-347. [In Russian: English summary p. 347.]

This is an illustrated account of the embryology of *Parascaris equorum* from the zygote stage to gastrulation, including a study of the distribution of DNA, RNA and of basic and acid proteins. The results show that the theory of the constancy of DNA in any one species of animal [see Boivin, R., Vendrely, R. & Vendrely, C., 1948, *C. R. Acad. Sci. Paris*, 226, No. 13 and Mirsky, A. E. & Ris, H., 1949, *Nature, Lond.*, 163, No. 4148] is applicable in the early stages of embryology of the eggs of *Parascaris*. G.I.P.

323—MAKAROV, P. V., 1961. "Zytochemische Veränderungen der Gameten von *Parascaris equorum* in Befruchtungsprozess." *Zentralblatt*, 80 (6), 665-680.

This is an illustrated account of chemical changes in nucleic acids, albumins, polysaccharides and lipids during gametogenesis and fertilization in the gametes of *Parascaris equorum* (var. *univalens* and *bivalens*). The study has shown that fertilization is accompanied by a complicated chemical transformation both in the spermatozoa and ova, leading to the conclusion that metabolic features peculiar to this process are involved. G.I.P.

2303—MAKAROV, P. V., 1964. [Relationship between the number of chromosomes and the volume of pronuclei in zygotes of *Parascaris equorum*.] *Doklady Akademii Nauk SSSR*, 154 (6), 1434-1437. [In Russian.]

Makarov used zygotes and developing eggs of *Parascaris equorum*, races *univalens* and *bivalens*, to study the relationship between the size of pronuclei and chromosomes. Only zygotes containing both pronuclei were used for measurement and the results were analysed for variability. The volume of the pronuclei (based on diameter values) of race *univalens* was 20% larger than that of the *bivalens* race (1212.72 cu.μ and 962.12 cu.μ). The volume of the chromosomes in the *univalens* race was 11.83 cu.μ and in the *bivalens* race 13.66 cu.μ (i.e. 1% and 3% of the pronuclear volume respectively). Feulgen reaction showed that the concentration of DNA was approximately the same in both races. Consequently, Makarov has shown that, contrary to Boveri's (1909) principles, the volume of the pronuclei in the 2 races of *P. equinus* is not proportional to either the number or volume of chromosomes or to the amount of DNA present. Furthermore, to verify the possible existence in one metaphase plate of short and long type chromosomes, first observed by Navashin in 1936 [see *Biol. Zh.*, 5 (2), 223] and confirmed by Makarov himself in 1958 [in *Zh. Obshch. Biol.*, 19 (5), 338], the author analysed biometrically the results of chromosome measurements in 50 plates of the *univalens* race and 75 plates of the *bivalens* race, comparing the results with theoretical expectations, and concludes that the lengths of chromosomes fall into a normal series of variation and that the earlier division into 2 types, based on visual interpretation only, was erroneous. G.I.P.

1369—MALECHA, J., 1970. [Study, in organotypic culture, of the hormonal control of spermatogenesis in *Hirudo medicinalis*.] "Étude, en culture organotypique, du contrôle hormonal de la spermatogenèse chez *Hirudo medicinalis* (Hirudinée Gnathobdelliforme)." *Gen. comp. Endocr.*, 14 (2), 313-320. [English summary p. 313.]

In *Hirudo medicinalis*, neurosecretory substances from the brain have been shown to stimulate spermatogenesis only at reductional mitosis. This is not, however, necessary for further development once the 2nd spermatocyte stage has been reached nor is it necessary to maintain mitosis in the gonads. A.J.

1370—MALECHA, J., 1970. [Influence of temperature on the spermatogenesis and neurosecretory activity of *Hirudo medicinalis* L.] "Influence de la température sur la spermatogenèse et l'activité neurosécrétoire d'*Hirudo medicinalis* L. (Hirudinée Gnathobdelliforme)." *Gen. comp. Endocr.*, 14 (2), 368-380. [English summary p. 368.]

Temperature has been shown to act on spermatogenesis in *Hirudo medicinalis* so that animals at different stages of gametogenesis are present throughout the year. Staining properties of fuchsinophilic cells and neurons of type $\beta 2$ of the central nervous system have been examined in relation to spermatogenesis. The possible gonadotropic role of fuchsinophilic cells and the problem of release of their secretions is discussed. A.J.

613—Comptes Rendus des Séances de la Société de Biologie. Paris.

a. MANSARD, M., 1954.—"Inclusions cytoplasmiques ovulaires chez quelques nématodes parasites de vertébrés." 148 (23/24), 2014-2017.

(613a) *Parascaris equorum* is the only nematode in which the oocyte has been much studied for inclusions. The globular inclusions in the oocytes of *Ascaris lumbricoides* from the pig, *Polydelphis anoura*, *Toxocara mystax*, *Hexameta* sp. and *Heterakis gallinae* are hyaline, protein in character and as in *P. equorum* are lightly tinged *in vivo* by Nile blue and deeply stained after fixation by the methylene blue of Mallory's stain. In *Subulura distans* and *S. dispar* the globules are somewhat opaque. In each case they are associated with the production of the middle of the three surrounding membranes formed at fertilization. The middle membrane, except in the species of *Subulura*, is chitinous. The inner one is lipid, birefringent, impermeable and devoid of the ascarylic acid found in the inner layer of the *P. equorum* oocyte. M.MCK.

561—MENZEL, M. Y. & SHORT, R. B., 1960. "Pachytene chromosomes in three species of schistosomes. Sex and autosomal bivalents in males and females." *Journal of Heredity*, 51 (1), 2-12. The pachytene chromosomes of male and female *Schistosomatium douthitti*, *Ornithobilharzia canaliculata* and *Schistosoma mansoni* are described and figured and presented diagrammatically by means of idiograms. Chromosome regions which stain more intensely than the rest are referred to as "heterochromatic" and those regions which do not show distinctive staining as "euchromatic". The females of all three species are heterogametic. In *Schistosomatium douthitti* and *O. canaliculata* the pachytene configurations show that the heteromorphic sex chromosomes pairs differ in the arrangement of pairing and differential segments. The Y chromosome of *S. douthitti* is apparently completely homologous with the two ends of X. The cytological evidence suggests that sex determination in this species depends upon a balance between the autosomes and factors located in the differential portion of X, and that Y does not possess a strongly female-determining effect. In *O. canaliculata* the mechanism is probably similar but the Y chromosome differs from that in *S. douthitti* in having a short differential segment—the heterochromatic right arm; the differential segment of X is long and euchromatic. *Schistosoma mansoni* lacks heteromorphic sex chromosomes but at pachytene in the female the longest bivalent, corresponding to the XY pair of the two other species is composed of one euchromatic and one partially heterochromatic chromosome, whereas in the male the corresponding bivalent is composed of two euchromatic chromosomes; it is concluded that the partially heterochromatic chromosome is a Y. S.W.

3689—MERCER, E. H. & DIXON, K. E., 1967.

"The fine structure of the cystogenic cells of the cercaria of *Fasciola hepatica* L." *Z. Zellforsch. mikrosk. Anat.*, 77 (3), 331-344.

The fine structure of the cells responsible for secretion of the layers of the metacercarial cyst of *Fasciola hepatica* is described. Tanned protein-secreting cells contain granules of mottled appearance, resembling the pattern of particles in the outer tanned layer of the cyst. These cells occur in cercariae within rediae, indicating a capacity to form cysts on emergence. In cells containing many large granules, smaller granules also occur suggesting the onset of a successive phase of synthesis. Mucopolysaccharide-secreting cells contain 3 types of granules which may represent stages in formation of a single class of granule. Mucoprotein-secreting cells contain granules that usually rupture during fixation. Keratin-forming cells contain unique "rodlets" which are composed of material rolled in a tight scroll-like spiral. The synthetic activity of these cells, as judged by organelle development, is compared with that of other gland cells. A reduction in organelle content in cells with highest product accumulation is described. The superficial resemblance of keratin rodlets to myelin fibres is noted and their form is considered in relation to mode of synthesis. K.A.W.

1555—MILLER, M. J., 1966. "Observations on spermatogenesis in *Onchocerca volvulus* and *Wuchereria bancrofti*." *Can. J. Zool.*, 44 (6), 1003-1006.

Serial sections of onchocercomata revealed that during spermatogenesis in *Onchocerca volvulus* the spermatocyte divides twice to give rise to 4 spermatids. The spermatid develops into an elongate, narrow, smooth-walled spermatozoan which, upon entering the female genital tract, becomes rounded and probably amoeboid. The chromosomes are distinct throughout all stages of spermatogenesis. The haploid number of chromosomes in this species is believed to be 5. In *Wuchereria bancrofti* the material, although incomplete, indicated the cellular changes in spermatogenesis to be similar to that seen in *O. volvulus*. Here the chromosomes were more clearly seen and the haploid number was consistently found to be 5. There are 14 plates.

[A.S.] M.B.-B.

172—Zeitschrift für Zellforschung und Mikroskopische Anatomie.

a. MINOUCHI, O., 1936—"Cytologische Studien über das Ei von *Polysiphonia integrissima* von der Einlage bis zu den frühen Furchungstadien." 24 (1), 85-127.

1502—MONNÉ, L., 1963. "On cyclical alterations in the Feulgen staining of nuclei during the development of nematodes." *Parasitology*, 53 (1/2), 273-283.

Various histochemical methods were used to study the role of deoxyribonucleic acids during the development of *Contracaecum osculatum*, *Toxascaris leonina* and *Parascaris equorum*. The results are described in detail with reference to chromatin diminution and to cyclical changes of the Feulgen staining of the nuclei in the 3 species. Previous histochemical investigations by the author on *Dictyocaulus viviparus*, *D. filaria* and *Metastrongylus elongatus* are briefly discussed. H.H.W.

925—Comptes Rendus des Séances de la Société de Biologie. Paris.

- a. MORICARD, R. & COIGNARD, J., 1941.—"Micro-injection quantitative avec mesure de volume portant sur le millionième de mm.c. greffe de spermatozoïdes dans l'oocyte d'*Ascaris megalocephala*." 135 (9/10), 667-671.

2194—MUKHERJEA, A. K. & RAY, H. N., 1958. "On the occurrence of polar body in the eggs of *Ascaris lumbricoides* as revealed by the M.R. stain." Bulletin of the Calcutta School of Tropical Medicine, 6 (2), 66-67.

Cytochemical study revealed the presence of a polar body in the fertilized eggs of *Ascaris lumbricoides* which was absent in unfertilized eggs. It was rich in chromatin, contained a protein rich in tyrosine, a lipid and some basophilic substances. Although the DNA and RNA character of these substances could not be finally proved, the appearance of a bluish-green colour in the body after M.R. staining [method of Mukherjea & Ray described in 1957 in Bull. Calcutta Sch. trop. Med., 5, p. 176] of the pyridine extracted eggs, strongly suggests the presence of one or both these acids. G. I. Pozniak

89—Canadian Journal of Zoology.

- c. MULVEY, R. H., 1955.—"Oogenesis in several free-living and plant-parasitic nematodes." 33 (4), 295-310.

(89c) Mulvey describes oogenesis in *Meloidogyne hapla* from lettuce roots, in *M. incognita* from potato tubers, potato roots and multiflora rose roots, in *Heterodera* sp. from hairy vetch roots and in *Diplogaster* sp. from decaying narcissus bulbs. In *Diplogaster* a polar cell was observed in the secondary oocyte but no polar bodies were seen in the parasitic species. In the *M. hapla* studies sperm nuclei were present in many of the eggs showing maturation divisions and in these eggs the haploid chromosome number appeared to be ten; in those eggs without sperm nuclei the number appeared to be eight. The haploid number for *M. incognita* from all three sources was eight and for *Diplogaster* was ten. No males were found in all the material examined and the telophase of the primary oocyte is the extent of the maturation division; consequently it could not be determined whether it was the haploid or diploid number of chromosomes present although there were at least 16 chromosomes in each daughter group of the first maturation division. S.W.

424—Nature. London.

- b. MULVEY, R. H., 1957.—"Chromosome number in the sugar-beet nematode *Heterodera schachtii* Schmidt." [Correspondence.] 180 (4595), 1212-1213.

(424b) Mulvey has studied the chromosome number and arrangement during meiosis of *Heterodera schachtii*. Two polar bodies are produced during oogenesis. Nine bivalents are formed during meiosis and at the first metaphase the largest is about 1μ long. The spermatozoa are small and tail-less and only one spermatozoon has been observed in each oocyte. S.W.

43—Nematologica.

- a. MULVEY, R. H., 1959.—"Preliminary studies on oogenesis in a cyst-forming nematode, *Heterodera avenae* (Nematoda: Heteroderidae)." 4 (1), 1-2. [German summary p. 2.]

(43a) The behaviour of the chromosomes during meiotic division of the egg of *Heterodera avenae* is described. There are nine pairs of chromosomes ($2n=18$), two polar bodies are formed, and only one sperm was found in each egg. J.J.H.

1035 MUTAFOVA, T. K. On the morphology of chromosomes in *Ascaridia galli* gonad cells (Sehrank 1788). Comptes Rendus de l'Académie Bulgare des Sciences (1972) 25 (3) 381-383 [En]

2144—NATH, V., GUPTA, B. L. & KOCHHAR, D. M., 1961. "The histochemistry of the male germ-cells of the nematode *Porrocaecum angusticolle*, a parasite in the vulture." *Quarterly Journal of Microscopical Science*, 102 (1), 39-50.

In *Porrocaecum angusticolle* the cytoplasm of the male germ cells contains phospholipid granules, refringent bodies (ascaridine granules of Pasteels, 1948) which consist at first of fibronucleo-proteins but, in the late spermatid, contain also some masked lipids, and mitochondria consisting of lipoproteins. The refringent bodies arise in close association with the Golgi bodies (which are phospholipid in nature) by the aggregation of cytoplasmic basophilic material; they fuse in the spermatid to form a single cone-like structure at the narrow posterior region. This appears to be homologous with the acrosome of normal nematode spermatozoa but is devoid of polysaccharide and seems unable to function as an acrosome because of its position behind the nucleus. Some polysaccharides have been demonstrated in the anterior region which may function as an acrosome. The paper is illustrated by line drawings, photomicrographs and a table showing the histochemistry of the cytoplasmic inclusions during spermatogenesis. S.W.

512—Research Bulletin of the Panjab University, Hoshiarpur.

a. NATH, V. & SINGH, S., 1956.—"The nematode sperm." No. 91 (Zoology), pp. 121-134.

(512a) Front observations on fixed and stained preparations of testes of *Porrocaecum angusticolle* and pig *Ascaris*. Nath & Singh describe the primary and secondary spermatocytes. Living late spermatids and spermatozoa were stained by phase-contrast microscopy. Spermatocytes in both species contained refringent granules; the authors were able to demonstrate, in *Ascaris*, the formation of these directly from Golgi elements; in *Porrocaecum* they coalesce during spermatocytosis and form the acrosome of the ripe sperm. The mitochondria remain granular in *Porrocaecum* but increase considerably in size in *Ascaris* appearing vesicular in the ripe sperm. The final stages in the transformation of the spermatid into the cone-shaped spermatozoon occur only after copulation and take place in the uterus. A mechanism for cytoplasmic reduction, which is probably unique, was observed in *Porrocaecum*; the spermatid extended pseudopodial processes which were then cut off. Golgi bodies were not observed in the ripe *Ascaris* spermatozoa. S.W.

372—Current Science, Bangalore.

a. NEELAKANTAIYA, K. H., 1955.—"Chromosomes in oogenesis of *Ascaris vitulorum*." [Correspondence.] 24 (9), 308.

(372a) Neelakantaiya has observed fertilization in *Neoascaris vitulorum*. The meiotic divisions of the primary oocyte nucleus do not take place until after the oocyte has been penetrated by a spermatozoon. Two polar bodies are extruded and there are nine bivalent chromosomes visible at metaphase. The male nucleus enlarges and becomes irregular in outline during the second meiotic division. Multipolar spindles were quite common in the first reduction division and these nuclei apparently degenerate. S.W.

274—Journal of Parasitology

cf. NEZ, M. M., 1954.—"Gametogenesis in *Schistosomium douthitti* (Cort)." 40 (5, Sect. 2), 37.

(274cf) The spermatocytes of *Schistosomium douthitti*, unlike those of the schistosomes of man, do not break apart during division but remain united in 32-celled rosettes as in hermafroditic flukes, each spermatozoid having two cytoplasmic flagella. In the egg, the oocytes remain diffuse until development begins after being laid in host tissue. The diploid chromosome number in the somatic and germ cells of both sexes is 14. M.MCK.

112—Journal of Parasitology

b. NEZ, M. M. & SHORT, R. B., 1957.—"Gametogenesis in *Schistosomium douthitti* (Cort) (Schistosomatidae: Trematoda)." 43 (2), 167-182.

(112b) The general pattern of spermatogenesis and oogenesis in *Schistosomium douthitti* follows that of other trematodes but maturation and fertilization are unique. After the eggs are deposited in the tissues. A primary spermatogonium gives rise to eight primary spermatocytes by three mitotic divisions and two maturation divisions produce a cluster of 32 spermatids. The mature spermatozoon has a thin elongate body with two flagella. R.T.L.

3001—NICHOLAS, W. L., 1970. "Taxonomy: genetics and evolution of parasites (Acanthocephala)." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part 3), pp. 506-507.

6000—NIELAND, M. L., 1968. "Electron microscope observations on the egg of *Taenia taeniiformis*." *J. Parasit.*, 54 (5), 957-969.

Electron microscopic observations were made on hatched and unhatched eggs of *Taenia taeniiformis*. The embryophoric blocks form beneath the plasma membrane of the embryophore cell. As they increase in size, mitochondria are incorporated into interconnecting lacunae. Cement substance appears in the interstices between the blocks. The oncospherical membrane, composed of 2 pairs of laminae separated by closely spaced vesicles, forms on the inner surface of the embryophore cell. It later detaches and surrounds the oncosphere and a new plasma membrane forms on the outer surface of the embryophore cell. The outer surface of the oncosphere is composed of a thin layer of cytoplasmic folds that rest on a basal lamina. The oncospherical hook is surrounded by a cytoplasm of 3 structures: the oncoblast, a "micelle" of folded membranes, and a midpiece. Hook muscles insert on the basal lamina external to the cytoplasm surrounding the hook. Dense intracristal granules were found in some mitochondria of oncoblasts. In a mature oncosphere the cells are filled with inclusions that may represent penetration gland granules. These may form a secretion that appears to be extruded through the surface of the hatched oncosphere. [23 electron photomicrographs.]

G.L.O. K.L.W.

707—Bulletin de la Société d'Histoire Naturelle de Toulouse.

a. NIGON, V., 1951.—"La gamétogénèse d'un nématode tétraploïde obtenu par voie expérimentale." 86 (1/2), 195-200.

(707a) Nigon produced a tetraploid race of *Rhabditis elegans* by exposing hermaphrodites to a temperature of 25°C., and was able to maintain this race through 78 generations. He has studied the chromosome complement (12 in the hermaphrodites, 11 in the true males), gametogenesis and an apparent alternation of generations in great detail and describes a number of morphological variations. S.W.

92—Comptes Rendus des Séances de la Société de Biologie. Paris.

a. NIGON, V. & BOVET, P., 1955.—"La teneur des gamètes en acide désoxyribonucléique chez *Parascaris equorum* Goetze." 149 (1/2), 129-130.

(92a) Nigon & Bovet have investigated the desoxyribonucleic acid content of fertilized unsegmented ova and spermatids of *Parascaris equorum* var. *univalens*. The ova contained about 120 times as much desoxyribonucleic acid as did the spermatids and, even allowing for the presence of two pronuclei and polar bodies, the content of the egg is probably $12.5 \times 10^{-6}\gamma$ compared with $2.5 \times 10^{-6}\gamma$ in the spermatid. This indicates that some of the substance is located in the cytoplasm; further investigation will show if the cytoplasmic desoxyribonucleic acid is identical with or comparable to that of the nucleus. S.W.

218—Chromosoma. Berlin & Heidelberg.

a. NIGON, V. & BRUN, J., 1955.—"L'évolution des structures nucléaires dans l'ovogénèse de *Caenorhabditis elegans* Maupas 1900." 7 (2/3), 129-169.

(218a) Nigon & Brun have made an extensive study of the nucleus during oogenesis in *Caenorhabditis elegans*. The first part of the paper describes the meiotic divisions in detail and is illustrated by a large number of photomicrographs. There appear to be certain differences from the classical concept, particularly in the way in which tetrad formation occurs. The second part of the paper is devoted to a comparison of the structures observed in the living nuclei, examined by ordinary light and by phase contrast, with those in nuclei fixed in osmic acid and acetic acid fixatives and subsequently stained, particularly by the Feulgen reaction.

S.W.

337—Archives de Biologie. Paris.

- a. NIGON, V. & DELAVAUT, R., 1952.—"L'évolution des acides nucléiques dans les cellules reproductives d'un nématode pseudogame." 63 (3), 393-410.

(337a) Nigon & Delavault describe the staining techniques used in their observations on the growth and maturation of the germ cells in *Rhabditis belari*, a pseudogamous species. They found the development to be analogous with that of *Parascaris equorum*. In the oocyte the pyrinophilic substances diminish slowly during growth and the nucleolus disappears shortly before the maturation divisions begin; in contrast, during spermatogenesis there is a sudden expulsion of ribonucleic acid at the moment of division. The staining reactions of the mature ovum are very different from those of the oocyte. During division there is an accumulation of ribonucleic granules round the spindle and a pyrinophilic zone appears near the spermatozoid when it penetrates the ovum. Just before segmentation begins, a cortical pyrinophilic zone appears at the poles and seems to be associated with the parts of the cytoplasm which are moving, suggesting a possible causal relationship. S.W.

71—Bulletin Biologique de la France et de la Belgique.

- a. NIGON, V. & ROBERT, M., 1952.—"Contribution à l'étude de la gamétogenèse chez *Parascaris equorum* Goeze. I. La formation des tétrades durant l'ovogenèse de la variété *univalens*." 86 (1), 101-104.

(71a) Nigon & Robert describe the processes leading up to the formation of tetrads during ovogenesis in *Parascaris equorum* var. *univalens*; their observations were made on material stained by the Feulgen reaction or by methyl-pyronine green. The resting nucleus contains a shadow-like patch which is feebly Feulgen-positive indicating that desoxyribonucleic acid may be present in structures other than the chromosomes. This "shadow" remains visible during the appearance and coalescence of the chromatin granules to form chromosomes, the nucleolus lying close beside it. The authors observed with surprise the formation of eight "primary chromosomes" identical with those of *P. equorum* var. *bivalens*. S.W.

359—Bulletin Biologique de la France et de la Belgique.

- a. NIGON, V. & ROMAN, E., 1952.—"Le déterminisme du sexe et le développement cyclique de *Strongyloides ratti*." 86 (4), 404-448.

(359a) Nigon & Roman describe and illustrate the morphology of the strain of *Strongyloides ratti* which they have studied. Free-living forms were cultured in faeces or on a gelose medium and contained a large proportion of filariform larvae. In faecal culture about 1.5% developed to sexual maturity with approximately equal numbers of each sex; on the gelose medium never more than 1% reached sexual maturity and almost all of these were males. All the parasitic forms were females which reproduced parthenogenetically, there being no chromosomal pairing and only a single maturation division. There were occasional anomalous divisions which led to doubling of the number of chromosomes or the loss of one element. The normal diploid number is 6. Free-living females had the full complement of chromosomes and reproduced by pseudogamy; the males appeared to have only five chromosomes and were derived from the intestinal females by the divisions in which one chromosome was lost. The authors conclude that sex is determined by a chromosomal mechanism, most if not all of the genetic males developing into free-living adults. The proportion of females developing into free-living adults appears to depend, however, on the medium in which they are cultured although other genetic factors exert some influence and explain the existence of diverse strains predominantly homogonic or heterogonic. S.W.

60—Zeitschrift für Parasitenkunde.

- c. NIYAMASENA, S. G., 1940.—"Chromosomen und Geschlecht bei *Bilharzia mansoni*." 11 (5), 690-701.

428—Journal of Parasitology

- P. OGREN, R. E. "Demonstration of ribonucleic acid in the onchosphere and adult of *Mesocostoides* ... nuclease." 38 (5), 498.

(428p) Ogren has stained sections of adults and onchospheres of *Mesocostoides variabilis* with methyl green-pyronin. The cytoplasm stained red, indicating the presence of ribonucleic acid and the nuclei stained green, indicating the presence of deoxyribonucleic acid. After treating with ribonuclease and staining as before there was no pyronin red colouration in the cytoplasm but the nuclei continued to stain green. Control sections treated with buffer solution without the enzyme, stained as had the original sections. Ogren concludes that if, under the conditions of the experiment, ribonuclease acted specifically on ribonucleic acid, this acid is normally present in the cytoplasm. S.W.

- 725—OGREN, R. E., 1962. "Embryonic development of a dilepidid tapeworm." Transactions of the American Microscopical Society, 81 (1), 65-72.

The embryonic development of *Dilepis undula* was found to be similar to that of other invertebrates. Maturation of the oocyte including growth and meiotic prophase occurs in the ovary, penetration of the spermatozoon in the oviduct and the completion of meiosis in the uterus. Cleavage was found to be unequal. Ogren states that no exact cell lineage studies have yet been made on tapeworm cleavage and that vitellogenesis, meiosis, the role of RNA, fertilization, early shell development and the axis or polarity of the embryo of cyclophyllideans require investigation. H.H.W.

- 1557—OGREN R., E., 1967. "Observations on the protoplasmic component of the epidermal gland in living oncospheres of *Hymenolepis diminuta*." [Abstract.] Trans. Am. microsc. Soc., 86 (1), 68.

- 6662—OGREN, R. E., 1968. "Characteristics for two classes of embryonic cells in oncospheres of *Hymenolepis diminuta* stained for cytoplasmic substances." Trans. Am. microsc. Soc., 87 (1), 82-97.

The morphological, cytochemical and developmental differences between two classes of large embryonic cells in oncospheres of *Hymenolepis diminuta* were studied using various stains and enzymes. Class I cells had nuclei with distinct chromosomes and compact RNA-rich cytoplasm and showed secretory and germinative activity. Class II cells had large interphase nuclei with indistinct chromosomes, large RNA-rich nucleoli and showed cytoplasmic regression, reduction in nuclear size and clumping of chromatin—characteristics of somatic cells in permanent interphase.

P.S.

3881—OGREN, R. E., 1968. "The basic cellular pattern for undifferentiated oncospheres of *Hymenolepis diminuta*." *Trans. Am. microsc. Soc.*, 87 (4), 448-463.

Immature *Hymenolepis diminuta* hexacanth with oncoblasts containing hooks in early shank formation [defined as early Stage II, see *Helminth. Abstr.*, 36, No. 677] are described. 3 envelopes were evident round the embryo: (i) shell (ii) an outer subshell envelope with 2 polar nuclei, and (iii) an inner granular envelope (embryophore) with 3 macromere nuclei. The embryo had marked bilateral and dorsal-ventral symmetry shown by pairing of most cells. The 6 oncoblasts each contained a specifically different hook blade. The somatic cell pattern included axial cells along the anterior-posterior line and cortical cells near the oncoblasts. 2 flask-shaped giant cells, prominent in the posterior dorsal cortex, contained a protoplasmic meshwork. In the posterior quadrants 2 pairs of germinative or embryonic stem cells divided once to form daughter embryonic cells. Thus, during Stage II, 5 pairs of large embryonic cells were present, divisible into 2 morphological classes. The lineage and continuity of cells can be traced from this immature stage through the infective to the reorganizing oncosphere. The numerous somatic cells had somewhat fixed positions, did not divide during the stage, and did not degenerate until after hooks were completed in the mature oncosphere. [A.S.] J.H.B.

352—*Bollettino della Società Italiana di Biologia Sperimentale.*

- a. PALUMBI, G., 1946.—"Osservazioni sulla struttura della cellula muscolare della parete del corpo di *Ascaris megalocephala*." 22 (5), 500-501.

1372—*Bulletin de la Société de Chimie Biologique.*

- a. PANIJEL, J., 1947.—"Contribution à l'étude biochimique de la fécondation chez *Ascaris megalocephala*." 29 (10/12), 1098-1106.

664—*Archives de Biologie. Paris.*

- a. PANIJEL, J. & PASTEELS, J., 1951.—"Analyse cytochimique de certains phénomènes de recharge en ribonucléoprotéines: le cas de l'oeuf de *Parascaris equorum* lors de la fécondation." 62 (3), 353-370.

(664a) Panijel & Pasteels describe some of the chemical changes which take place during fertilization in *Parascaris equorum*. The term "recharge" covers a complex combination of biochemical changes which mark the fertilization of the ovum. Changes in the spermatozoid during fertilization appear to be essentially the formation of a particular protein which allows the ovum to become recharged with basophilic ribonucleoproteins. The authors have demonstrated, spectrophotometrically and by centrifuging, that there are at least two stages to this process. S.W.

*2705—PARENTI, U., 1962. "Fecondazione e corredo cromosomico di *Paramermis contorta* parassita di *Chironomus tentans*." *Atti Acad. naz. Lincei Rc.*, Serie 8, 32, 699-702.

6004—PASHCHENKO, L. F., 1961. [Early stages of spermatogenesis in *Taenia saginata*.] *Problemy Parazit. i Inf. ukr. respubl. nauch. Obshch. Parazit.*, 1, 112-122. [In Russian.]

2991—PASHCHENKO, L. F., 1965. [Development of the later stages of spermatogenesis in *Taenia saginata*.] *Dokl. Akad. Nauk SSSR*, 163 (1), 269-271. [In Russian.]

Pashchenko continues his study of spermatogenesis in *Taenia saginata* [see *Trudy ukr. respubl. nauch. Obshch. Parazit.*, 1961, 1, 112-122.] giving an illustrated account of the development of the symplastic spermatid to the spermatozoon. G.I.P.

3820—PASTERNAK, J.; SAMOILOFF, M. R., 1972. "Cytoplasmic organelles present during spermatogenesis in the free-living nematode *Panagrellus silusiae*." *Canadian Journal of Zoology*, 50 (2), 147-151 + 3 pp. plates. [En, fr] Dept. of Biology, Univ. of Waterloo, Waterloo, Ontario, Canada.

An ultrastructural study of the sperm of the free-living nematode, *Panagrellus silusiae*, was carried out in order to establish a basis for comparison with parasitic species. 2 unique kinds of cytoplasmic organelles were observed during the early stages of spermatogenesis. Vesicular bodies (V-bodies) line the internal cell surface of the spherical, flagellate sperm and are formed in the primary spermatocytes. Before the V-bodies appear, many double membrane-bound, ovoid crystalline bodies (C-bodies) are produced which subsequently degenerate with no trace of fibrillar material. The possible roles played by these organelles during spermiogenesis and in the spermatozoon are discussed. M.B.B.

2707—PAVLOVA, L. I., 1963. [Comparative morphological and cytochemical investigation of gametogenesis, fertilization and egg forming in cestodes (*Diphyllobothrium latum* and *Taenia saginata*).] [Abstract.] *Mater. nauch. Konf. ves. Obshch. Geimint.*, Year 1963, Part II, p. 34-36. [In Russian.]

6005—PAVLOVA, L. I., 1965. [Cytological study of the development of female genital organs in *Taenia saginata*.] *Helminthologia*, 6 (1/4), 135-144. [In Russian; English & German summaries pp. 143-144.]

460—PAVLOVA, L. I., 1969. [Cytological study of cysticercus stages of certain cestodes in the light of host-parasite relationships.] [Abstract.] [All-Union Conference (7th) on the natural focal occurrence of diseases and general problems in animal parasitology, Alma-Ata, 1969. General helminthology.] pp. 75-76. [In Russian.]

The cellular structures of the bladders of the cyst wall of *Cysticercus bovis*, *C. cellulosae* and *Diphyllobothrium latum* are compared. P.S.G.

- 775—PAVLOVA, L. I. & BOGOMOLOVA, N. A., 1960. [Cytology and cytochemistry of Mehli's gland of liver-fluke and *Diphyllbothrium latum* in connection with the formation of the egg membrane.] [Abstract.] *Tezisi Dokl. Nauchnoi Konf. Vses. Obshch. Gel'm., Moscow*, December 15-20, 1960, pp. 102-103. [In Russian.]

Mehli's gland in *Diphyllbothrium latum* and the liver-fluke originates from a few cells indistinguishable from basophilic amoeboblasts. The formed gland is a complex of unicellular glands, which in *D. latum* are similar to desmoblasts. The cells produce secretions containing acid proteins and polysaccharides resistant to diastase. A high RNA content is observed during active protein synthesis, i.e. during synthesis of the secretion and formation of collagenous fibres. The author suggests that the secretion is near in its nature to collagen and that it takes part in the formation of the egg-shell.

G.I.P.

526—Journal of Cellular and Comparative Physiology.

- a. PEASE, D. C. & MARSLAND, D. A., 1939.—“The cleavage of *Ascaris* eggs under exceptionally high pressure.” 14 (3), 407-408.

438—Archives de Biologie. Liège & Paris.

- a. PENNYPACKER, M. I., 1936.—“The chromosomes in the maturation of the germ cells of the frog lung fluke, *Pneumonoecus medioplexus*.” 47 (2), 309-317.

447—Journal of Morphology.

- a. PENNYPACKER, M. I., 1940.—“The chromosomes and extranuclear material in the maturing germ cells of a frog lung fluke, *Pneumonoecus similiplexus* Stafford.” 66 (3), 481-495.

3—Nematologica

- m. PERRY, V. G., 1959.—“A note on digonic hermaphroditism in spiral nematodes (*Helicoty-*

(43m) Perry reports that certain *Helicotylenchus* spp., including *H. nanmus*, are digonic hermaphrodites, the sperm and ova being produced in two distinct reproductive organs of the same individual. The spermatozoa originate in a spheroid structure located dorsally from the oviduct near to its junction with the spermatheca. The structure called the “Spermagonium” contains a primordial germ cell which apparently produces a primary spermatocyte by mitosis which then by meiosis becomes four spermatozoa. These move through the oviduct to the spermatheca where they fertilize the oocytes.

D.J.H.

- 933—PEVNEVA, V. D., 1966. [Species composition of *Haemonchus* (Nematoda, Trichostrongylidae) in the USSR.] *Zool. Zh.*, 46 (8), 1121-1129. [In Russian: English summary p. 1129.]

About 1,500 males and females of *Haemonchus* from cattle and over 3,000 from sheep from different areas in the USSR (lower Volga, northern Caucasus, Transbaikal, Moldavia, Georgia and Uzbekistan) were measured. The variability of the morphological characters used in taxonomy is noted and compared with data of other authors. From the results, Pevneva concludes that there is no basis for differentiating *H. placei* from *H. contortus* and that in the USSR there is only one widely distributed species. This conclusion is further upheld by cytological studies and cross-infection experiments which showed that worms from both hosts had the same number and size of chromosomes and that there were no major differences in larval adaptability, time of development and length of life.

G.I.P.

- 3161—PICKEL, V. M. & JONES, A. W., 1967.
 "Chromosomes of a monogenetic trematode,
Diclybothrium hamulatum (Simer, 1929) Price,
 1942." *Trans. Am. microsc. Soc.*, 86(2), 212-214.

The chromosomes of *Diclybothrium hamulatum* are described from squash preparations. Metaphase plates of somatic cells showed a diploid number of 12; the 6 pairs measured from 2 to 5 μ . The shapes of the chromosomes and centromere positions are depicted. Chromosomes were also observed during the first metaphase of meiosis when the orientation of the tetrads, each held together by its chiasmata, enables the exact position of the centromere to be established.
 M.B-B.

- 6093—FIGULEVSKI, S. V. & MITENEV, V. K.,
 1965. [Cytomorphological changes in plerocercoids of the broad fish tapeworm *Diphyllobothrium latum*.] *Mater. nauch. Konf. vses. Obshch. Gel'mint.*, Year 1965, Part IV, pp. 195-200. [In Russian.]

- 1239—PILLAI, J. K. & TAYLOR, D. P., 1968.
 "Biology of *Paroigolaimella bernensis* and *Fictor anchicopropha* (Diplogasterinae) in laboratory culture." *Nematologica*, 14 (2), 159-170. [German summary p. 170.]

The biology of *Paroigolaimella bernensis* and *Fictor anchicopropha* was studied under laboratory conditions on bacterial-amoebic or nematode cultures. The morphometrics of these populations differed considerably from those collected in nature. Eggs of *P. bernensis* exhibited a holoblastic spiral mode of division during development. Generation time varied from 46 to 48 hours at 30°C., 90 to 100 hours at 15°C. for *P. bernensis* and from 40 to 44 hours at 35°C. and 160 to 178 hours at 15°C. for *F. anchicopropha*. Maximum numbers were reached in shorter times at higher temperatures and declined sharply after the maximum was reached. Progeny of 5 females averaged about 18,000 for each species after 10 days at 20°C. Many other species belonging to other genera could also be reared in the laboratory.
 M.M.H.

143—Transactions of the American Microscopical Society.

- c. PIN-DJI CHEN, 1937.—"The germ cell cycle in the trematode, *Paragonimus kellicotti* Ward." 56 (2), 208-236.

- 5160—PINKAVA, D. J., 1970. "Trisomism and triploidy via heterofertilization in *Parascaris equorum*." *J. Hered.*, 61 (3), 122.

Examination of uterine sections of *Parascaris equorum* has revealed 2 abnormalities occurring in the embryonic stages. A trisomic zygote is illustrated and compared with the usual disomic zygote. Evidence for triploidy via heterofertilization is demonstrated in 2 photomicrographs, one showing an ovum (of the bivalent form) including 3 pronuclei and an oocyte (of the univalent form) undergoing meiosis while accompanied by 2 sperms, all within a single membrane.
 D.A.Cz.

486—Anzeiger der Kais. Akademie der Wissenschaften. Math. Nat. Kl. Wien.

- *a. PINTNER, T., 1935.—"Über die Gewebe des Cestoden." 72 (1), 6-10.

1506—PRICE, E. W., 1963. "A new genus and species of monogenetic trematode from a shark, with a review of the family Microbothriidae Price, 1936." *Proceedings of the Helminthological Society of Washington*, 30 (2), 213-218.

Neodermophtherius harkomi n.g., n.sp. from the gill arches of a lemon shark, *Negaprion brevirostris*, caught at Beaufort, North Carolina, U.S.A., differs from *Dermophtherius* in the armature of the cirrus, in having 11 testes and a vagina which opens into the genital atrium near the female genital pore. The status of the Microbothriidae is reviewed and *Dermophtheriinae* n.subf. is erected to include *Dermophtherius* and *Neodermophtherius*. [Price in 1964 in *Proc. helm. Soc. Wash.*, 31, 128 refers to errors made in this paper; he states that on p. 213 *Neodermophtheriinae* should have been *Dermophtheriinae* and that on the same page and elsewhere *Neodermophtherius* and *Dermophtherius* should have been *Neodermophthirius* and *Dermophthirius*, respectively.] H.H.W.

4660—PROFFITT, M. R. & JONES, A. W., 1969. "Chromosome analysis of *Hymenolepis microstoma*." *Expl Parasit.*, 25 (1/3), 72-84.

Micro-spread-dispersion and modified squash preparations of the chromosomes of *Hymenolepis microstoma* showed that the diploid number was 12 and all chromosomes were acrocentric. The techniques are described in detail. Some sort of "pairing" appeared to occur during anaphase in some chromosomes. Members of at least one of the "pairs" were not homologous with respect to length. The mean lengths of the chromosomes in the diploid complement could be arranged in descending order and at the 1% confidence level the differences in length among the 6 longest were significant. There was no significant difference between the lengths of the 6 shorter chromosomes. The pressure necessary to obtain flat squashes may have caused the observed variations in chromosome length. S.W.

1863—RACE, G. J., MARTIN, J. H., LARSH, J. E. & MICHAELS, R., 1970. "Scanning and transmission electron microscopy (EM) of *Schistosoma mansoni* ova, structure and topography of the shell pores." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part I), pp. 276-277.

†1834—RACE, G. J., MICHAELS, R. M., MARTIN, J. H., LARSH, Jr., J. E. & MATTHEWS, J. L., 1969. "*Schistosoma mansoni* eggs: an electron microscopic study of shell pores and microbarbs." *Proc. Soc. exp. Biol. Med.*, 130 (3), 990-992.

Eggs of *Schistosoma mansoni* were fixed in paraformaldehyde and osmium and examined in thin sections. Both microbarbs and pores were seen on the shell. Pores, located chiefly on the anterior region of the shell and lined by a trilaminar membrane, may allow release of materials from the eggs. Barbs may function in penetration of endothelium and tissues. K.A.W.

2562—RACTLIFFE, L. H., 1971. "The process of egg formation in *Fasciola hepatica*." *Revta ibér. Parasit.*, 31 (1/2), 135. [En] New York State Veterinary College, Cornell University, Ithaca, N.Y. 14850, USA.

The process of egg formation in *Fasciola hepatica* is described. At regular intervals, contractions of the wall of the vitelline reservoir and of the common vitelline duct and ovovitelline duct impelled vitelline cells towards the ootype. An oocyte, partly projecting from the oviduct into the lumen of the ovovitelline duct, was pushed into the ootype by the vitelline cells. There, a thin membrane appeared around the group of cells. Shell globules were released from the vitelline cells after the egg had passed into the uterus; they coalesced on the membrane formed in the ootype. A.J.

747—Atti della Accademia Nazionale dei Lincei. Rendiconti. Classe di Scienze, Fisiche, Matematiche e Naturali. Rome.

- a. RANZOLI, F., 1955.—"Osservazioni preliminari sulle cellule vitelline e gli ovociti di *Fasciola hepatica* L." Serie 8, 19 (3/4), 171-177.

133—Nature. London.

- d. RAWSON, D., 1955.—"Maturation divisions of the ova in the pseudophyllidean cestode, *Eubothrium crassum* (Bloch)." [Correspondence.] 176 (4473), 167.

(133d) Rawson has demonstrated that in *Eubothrium crassum* the polar bodies formed during maturation of the ovum are easily distinguishable from yolk cells. She concludes that the uterine duct between the oviduct and Mehlis' gland, usually referred to as the "fertilization canal" or "befruchtungsgang", is a duct through which the contents pass quickly. Her observations on *E. crassum* agree with those of Motomura on *Archigetes appendiculatus*; fertilization takes place in that part of the uterine duct immediately beyond Mehlis' gland. There are three photomicrographs of the egg complex. S.W.

3821—REDDY, P. V.; SUBRAMANYAM, S., 1971. "Some cytological observations in the digenetic trematode *Philophthalmus* sp. from eagle." [Correspondence.] *Current Science*, 40 (21), 578-579. [En] Dept. of Zoology, Government Arts and Science College, Jagtial, Andhra Pradesh, India.

Cytological studies on the testes of *Philophthalmus* sp. from an eagle in India showed the diploid number of chromosomes to be 20. The sperms were found to have a characteristic morphology, with a convex or biconvex acrosome. The results are illustrated with 6 photomicrographs. M.R.N.S.

3033—REISINGER, E., 1964. "Zur Feinstruktur des paranephridialen Plexus und der Cyrtocyten von *Codonocephalus* (Trematoda Digenea: Strigeidae)." *Zoologischer Anzeiger*, 172 (1), 16-22.

The study undertaken in 1962 of the paranephridial plexus of *Codonocephalus* from *Rana esculenta* and *R. ridibunda* [for abstract see *Helv. Abs.*, 32, No. 2397] has now been continued with the electron microscope and the finer structure is described and illustrated. The cells of the plexus are periodically canalized and are rich in vacuoles; they are surrounded by a dense coat of mitochondria embedded in parenchymatous cells. The large number of the mitochondria and their distribution confirm that the plexus is concerned with anaerobic respiration aiding glycogen formation. The terminal organs of the plexus are cyrtocytes of the *Fasciola*-type, which, however, are divided from one another by narrow slits. G.I.P.

- 479—RÉVY, D., 1934.—"Heteroderás zabgyökerek cytologiai és anatómiai vizsgálata." [Anatomical and cytological studies on *H. schachtii* infecting oat roots.] Dissertation. Magyaróvár, 34 pp. [German summary pp. 31-32.]

266—Nature. London.

- a. RILEY, R. & CHAPMAN, V., 1957.—"Chromosomes of the potato root eelworm." [Correspondence.] 180 (4587), 662.

(266a) Riley & Chapman have observed mitosis and meiosis in cysts of *Heterodera rostochiensis* at all stages of development and have demonstrated that this species is cytologically distinct from *Meloidogyne incognita* and an unidentified species of *Heterodera*, both of which have been reported to have 16 chromosomes. At mitotic anaphase there was no convergence to the poles, the groups of chromosomes separating in parallel lines. Mitotic chromosomes could not be counted. Nine pairs were observed at the first metaphase of meiosis; the complement consisted of three larger and six smaller pairs although all were very small, the largest being only about 1.2μ long at this stage. Anaphase and telophase were normal. The authors consider that cytological evidence may be useful in defining the limits of eelworm species. S.W.

- 2148—ROBINSON, E. S., 1964. "Chromosome morphology and behavior in *Macracanthorhynchus hirudinaceus*." *Journal of Parasitology*, 50 (5), 694-697.

Robinson describes the 6 chromosomes of *Macracanthorhynchus hirudinaceus*. One pair of acrocentric chromosomes is rod-shaped; the 2 pairs of autosomes are metacentric. In the male the Y-chromosome is subacrocentric. There are minor differences between the Australian material described here and the American material described by Jones & Ward, 1950 [see *J. Parasit.*, 36, 86]. W.L.B.

- 1429—ROBINSON, E. S., 1965. "The chromosomes of *Moniliformis dubius* (Acanthocephala)." *J. Parasit.*, 51 (3), 430-432.

Stained squash preparations of testes and ovarian masses of *Moniliformis dubius* show that there are 8 chromosomes in females and 7 in males. Robinson therefore proposes an XO sex-determining mechanism. Meiosis occurs in oocytes after sperm penetration. The X chromosomes move to the opposite poles ahead of the autosomes in the oocytes. W.L.B.

105—Journal of Parasitology.

- a. ROGERS, R. A., 1956.—"A study of eggs of *Ascaris lumbricoides* var. *suum* with the electron microscope." 42 (2), 97-108.

(105a) Rogers has studied *Ascaris* ova with the electron microscope and his observations confirm that the egg envelope is composed of an outer protein layer, a middle chitinous shell and an inner lipid layer. Limiting membranes border the protein coat and chitinous layer. The protein coat appears as dense reticulated material, the chitinous coat is composed of highly branched microfibrils and the lipid layer, in the living state, has a striated appearance. No structures were observed in the perivitelline space but large numbers of granules and vacuoles are located within a very coarse cytoplasmic reticulum inside the egg itself. Hyaline spheres were observed in immature eggs. The paper is illustrated with a number of photographs. S.W.

776—ROSARIO, B., 1964. "An electron microscope study of spermatogenesis in cestodes." *J. Ultrastruct. Res.*, 11 (5/6), 412-427.

The formation of spermatozoa from cytophores is described from sections of osmium-fixed *Hymenolepis nana* and *H. diminuta*. Clefts appear at the periphery of the syncytial cytophore through invagination of the cell membrane; each cleft elongates and arches over a peripheral nucleus ultimately to free an elongate spermatozoan. The mature sperm contains a variably placed nucleus and the 9+2 pattern of fibrils of a flagellum, although the peripheral cell membrane remains some distance from these fibrils. The outer membrane bears helically wound fibres on its outer surface. The observations are related to earlier descriptions of spermatogenesis in cestodes.

K.A.W.

863—ROSENBLUTH, J., 1965. "Ultrastructure of somatic muscle cells in *Ascaris lumbricoides*. II. Intermuscular junctions, neuromuscular junctions, and glycogen stores." *J. Cell Biol.*, 26 (2), 579-591.

The cell body and innervation process with its neuromuscular junction were examined with electron microscopy. Most of the cytoplasm of the cell body is filled with particulate glycogen; mitochondria and lipid droplets are scarce. The peripheral cytoplasm contains mitochondria and fibrillar bundles. The cell body of starved nematodes is reduced in size and glycogen particles are absent. Innervation processes contain patches of glycogen and fibrillar bundles. The processes become thinner near the nerve cord and branches of their tips become intertwined over the nerve cord. Intercellular spaces are reduced and in places obliterated by the formation of "tight junctions". Synapses between innervation processes and nerves are marked by presynaptic vesicles, giant mitochondria and multivesicular bodies within neurons. These observations—especially the presence of tight junctions—are discussed in terms of impulse conduction within the musculature.

K.A.W.

555—Novitates Zoologicae.

b. ROTHSCCHILD, M., 1939.—"Large and small flame-cells in a cercaria (Trematoda)." 41, p. 376.

(555b) An undescribed alveocadiid cercaria from *Peringia ulvae* Pennant from Plymouth possessed dimorphic flame cells.

M.R.

2288 RYBICKA, K., 1961. "Morphological and cytochemical studies on the development of the cestode *Diorchis ransomi* Schultz 1940." *Acta Parasitologica Polonica*, 9 (22/30), 279-304. [Polish summary pp. 303-304.]

The author describes in detail the development of *Diorchis ransomi* in *Fulica atra* and in the intermediate host, *Cypridopsis vidua*. Histochemical techniques were used in the study. Spermatogenesis in *D. ransomi* is thought to be like that in *Fasciola hepatica* as described by Govaert, 1960 [for abstract see *Helm. Abs.*, 31, No. 560] and it is stressed that a non-glycogenous polysaccharide is present in Mehlis' gland. It is emphasized that during the development of the pre-oncosphere a reduction occurs in the total number of cells. The nature of the egg membranes in cestode eggs is discussed in detail with many references to previous work. The author states that *D. ransomi* grows very quickly after entering the haemocoel of the intermediate host owing to the growth and multiplication of the plastrin cells. Further observation showed that the larva and adult cestode develop from the plastrin cells.

H.H.W.

2361—RYBICKA, K., 1962. "Observations sur la spermatogenèse d'un cestode pseudophyllidien, *Triacnophorus lucii* (Müll., 1776)." *Bulletin de la Société Neuchâtoise des Sciences Naturelles*, 85, 177-181. [English summary p. 180.]

Spermatogenesis in cestodes has rarely been studied. In *Triacnophorus lucii* the general pattern follows that reported in the Trematoda with the exception that there are 3 spermatogonial divisions followed by 2 maturation divisions resulting in the formation of 64 spermatids. The spermatozoa are filamentous, leaving the testes in bundles, and have one end which stains with Feulgen or methyl green, the other remaining unstained with these reagents but staining with eosin after Prenant's trichrome. There are 7 figures and 4 references.
S.W.

2794—RYBICKA, K., 1964. "Embryonic development of *Moniezia expansa* (Rud., 1810) (Cyclophyllidae, Anoplocephalidae)." *Acta Parasitologica Polonica*, 12 (19/29), 313-325. [Polish summary p. 325.]

Moniezia expansa was fixed in Carnoy's fluid, embedded in paraffin wax, sectioned at 8-12 μ and stained histochemically for this embryological study. The oocyte, vitelline cell, sperm, maturation of the oocyte and formation of the capsule are briefly described with the aid of photomicrographs. Cleavage, the preoncosphere, oncosphere and pyriform apparatus are described and figured in detail. Cleavage is total and unequal, resulting in 3 micromeres, 3 mesomeres and 3 macromeres. The results agree with those from other Anoplocephalidae.
H.H.W.

1351—RYBICKA, K., 1964. "Gametogenesis and embryonic development in *Dipylidium caninum*." *Experimental Parasitology*. New York, 15 (4), 293-313.

Adult *Dipylidium caninum* were obtained from dogs by autopsy, relaxed in tap-water, cut into strips about 2 cm. long and fixed in Carnoy's fluid; the strips were dehydrated in alcohol, cleared in methylbenzoate, embedded in paraffin wax and cut at 5 μ . The following stains were used: Prenant's trichrome; Feulgen for demonstrating DNA; methyl green-pyronine, with ribonuclease control, for RNA; toluidine blue for both DNA and RNA; and periodic acid Schiff (PAS), with saliva control, for glycogen. The author describes the following in detail with reference to 18 photomicrographs and 17 clear line drawings: spermatogenesis, oogenesis, fertilization, the early embryo, the preoncosphere, embryophore formation, development of the embryonic hooks, penetration gland development, cellular changes in the preoncosphere and the oncosphere. The results are discussed in detail with reference to 55 papers. The author states that the pattern of spermatogenesis, oogenesis and development of vitelline cells does not differ from that of the other cestode species previously studied. A hypothesis is presented on the homology of the preoncosphere of Cyclophyllidae with the coracidium of the Pseudophyllidae.
H.H.W.

777—RYBICKA, K., 1965. "Rozwój badań nad cytologią tasiemców." *Wiad. parazyt.*, 11 (1/2), 3-15. [English summary p. 15.]

This is an historical review of the literature on the cytology of cestodes.
J.H.B.

3005—RYBICKA, K., 1970. "Ribonucleoprotein bodies in macromeres of *Hymenolepis diminuta*." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part I), p. 295.

- 3006—SAKAMOTO, T., YAMASHITA, J. & OHBAYASHI, M., 1967. "Studies on echinococcosis. XVIII. Observations on tissue cultured germinal cells of larval *Echinococcus multilocularis*." *Jap. J. vet. Res.*, 15 (2), 75-84.

Germinal cells from trypsinized daughter cysts of Alaskan strain *Echinococcus multilocularis* from a cotton-rat, were cultured alone, and with host fibroblasts, in 199 Medium containing various organic additives. The development and morphology of the cells is described in detail and illustrated by 18 photomicrographs. Various types of germinal cell were recognized, vacuolated syncytia appearing by the 5th day. Cells survived for about 100 days but multiplication beyond the 3rd subculture was much reduced. Chromosome number in mitotic cells was estimated at <18 . Cells released from the host connective tissue just beyond the hydatid tissue are also described: they resembled fibroblasts and had a diploid chromosome number of 54. Sheet-cultured fibroblasts from host connective tissue introduced into the germinal cell culture, surrounded the germinal cells and appeared to absorb them. Best results were obtained with 199 and YLH (+ 20 to 30% calf serum and 20% heated cotton-rat liver extract) medium in a 3:1 ratio. Similar tissue culture, with germinal cells from an hydatid from a cotton-rat infected with eggs from a Japanese *E. multilocularis* strain, was less successful. P.S.G.

- 3034—SAKSENA, J. N., 1962. "Chromosome studies in the digenetic trematodes of the family Paramphistomatidae." *Proceedings of the National Academy of Sciences, India. Section B*, 32 (3), 177-184.

Spermatogenesis in *Diplodiscus amphichrus magnus* is similar to the process observed in other paramphistomes; a centrosome is incorporated in the spermatozoon which consists of a head and tail, the head tapering gradually into the tail. The diploid chromosome number is 18, with 3 large, 3 medium and 3 small pairs. The chiasma frequency is 2.04 per bivalent at diplotene, the largest pair invariably showing 3 chiasmata. S.W.

- 4326—SAKSENA, J. N., 1969. "Chromosome studies of fifteen species of Indian digenetic trematodes." *Proc. natn. Acad. Sci. India, Sect. B*, 39 (1/2), 81-110.

The chromosomes of 15 species of *Digena* from India are described in detail. Chromosome number and morphology in the *Digena* are reviewed and related to classification, and the evolution of chromosome numbers in hermaphrodite animals is discussed. This paper does not lend itself to abstracting and should be consulted in the original. A bibliography of over 90 references is appended. A.J.

- 2856—SALAZAR MALLÉN, M., GONZÁLEZ BARRANCO, D. & SÁMANO, A., 1962. "Cromosomas de *Onchocerca volvulus*." *Salud Pública de México*, 4 (6), 983-984. [English summary p. 984.]

Adult *Onchocerca volvulus* were stained with 0.3% May-Grunwald in methyl alcohol and 10% Giemsa then mounted in Canada balsam for the examination of male and female chromosomes. The diploid chromosome number is 4 and the haploid 2. There are 2 photomicrographs. L.E-L.

117—Nature. London.

- b. SANDERSON, A. E., 1953.—“Maturation and probable gynogenesis in the liver fluke, *Fasciola hepatica* L.” 172 (4368), 110–112.

(117b) Sanderson finds that the diploid chromosome number in *Fasciola hepatica* is 20. During the maturation of the egg the spindle is formed independently of the sperm penetrating and there is no evidence of the formation of a male pronucleus. In an addendum she draws attention to a paper by John [for abstract see No. 131a below] in which he states that the diploid number is 12. Disagreeing with this Sanderson points out the disadvantages of making counts on sectioned material, rather than on smear and squash preparations. S.W.

174—Proceedings of the Royal Society of Edinburgh. Section B.

- a. SANDERSON, A. R., 1959.—“Maturation and fertilization in two digenetic trematodes, *Haplometra cylindracea* (Zeder 1800) and *Fasciola hepatica* (L.).” 67 (2), 83–98.

(174a) Sanderson has examined, by the squash technique using either aceto-orcein or a fixative followed by Feulgen, maturation and fertilization in *Haplometra cylindracea* and *Fasciola hepatica*. In both species two polocyte nuclei are extruded although this is very difficult to demonstrate in *F. hepatica* except in half-grown flukes. The egg capsule contains four, rarely five, yolk cells in *H. cylindracea* and about 50 in *F. hepatica*. Spermatogenesis gives rise to a rosette of 32 spermatids which elongate enormously, the head in *F. hepatica* measuring 40μ . From her present observations the author concludes that gynogenesis does not occur in *F. hepatica* as she had suggested earlier [for abstract see Helm. Abs., 22, No. 117b]; in both species the sperm enters the ooplasm, two pronuclei are formed and fusion occurs. The first cleavage is unequal. The chromosome number in both appears to be $2n=20$ although haploid counts of nine and 11 have been observed. The paper is illustrated by line drawings and six plates of photomicrographs. S.W.

3882—SATO, M., OH, M. & SAKODA, K., 1967.

“Electron microscopic study of spermatogenesis in the lung fluke (*Paragonimus miyazakii*).”
Z. Zellforsch. mikrosk. Anat., 77 (2), 232–243.

Paragonimus miyazakii testis contains peripheral spermatogonia surrounded by supporting cells. Cytoplasm of spermatocytes is fused to form a central cytophore, connecting further stages of development. The spermatid nucleus elongates and condenses to contain dense chromatin threads and granules. Microtubules form under the cell membrane close to the nucleus. Protrusion of this region of the cell surface gives a protuberance which develops 2 apparently free flagella. With further development the flagella come to lie within the cell membrane of the sperm. The sperm head contains a dense material, the dorsal nucleus and ventral mitochondria, while flagellar complexes lie ventro-laterally. The sperm tail contains a projection of the nuclear membrane and mitochondria. Microtubules extend from the posterior end of the head to near the tail tip. The observations are considered similar to previous descriptions of spermatogenesis in platyhelminths. K.A.W.

2317—SCHACHER, J. F. & GEDDAWI, M. K.,

1969. “An analysis of speciation and evolution in *Wuchereria bancrofti* by the study of nuclear constancy (cutely) in microfilariae.” *Ann. trop. Med. Parasit.*, 63 (1), 67–82.

Statistical analysis was carried out on the numbers of nuclei between the cephalic space and the nerve ring, between the nerve ring and the excretory pore and between the cephalic space and the excretory pore of *Wuchereria bancrofti* microfilariae obtained from 15 widely separated geographical regions. The results are discussed with respect to the evolution and the taxonomic status of *W. bancrofti*.

J.H.B.

723—SCHANZEL, H. & BENEŠ, S., 1962.

"*Strongyloides papillosus*-Larven als Erreger einer akuten Balanopostitis bei Bullen." [Abstract.]

Zeitschrift für Parasitenkunde, 22 (2), 110.

The authors observed acute inflammation of the end of the penis and of the preputial mucous membrane in 26 bulls caused by third-stage larvae of *Strongyloides papillosus*. This disease occurs in all seasons. Clinical and microbiological studies proved that other causes can be ruled out. K.R.

680 SCHMIDT, G. D. Early embryology of the acanthocephalan *Mediorhynchus grandis* Van Cleave, 1916. *Transactions of the American Microscopical Society* (1973) 92 (3) 512-516 [En] Dept. of Biology, Univ. of Northern Colorado, Greeley, Colorado 80631, USA.

The Feulgen nuclear staining technique was used to study the embryology of *Mediorhynchus grandis* from fertilization to the formation of the acanthor. The process is described in detail, illustrated and compared with that in other species.

AJ

951—Verhandlungen der Deutschen Zoologischen Gesellschaft. (Zoologischer Anzeiger, Supplementband 15.)

a. SCHWÖBEL, W., 1951.—"Zeitrafferfilm-Untersuchungen über die Granulabewegung im Ei vom Pferdespulwurm *Parascaris equorum* (Goeze)." Year 1950, pp. 44-51.

(951a) [A fuller account of this paper appears in *Protoplasma*, 1952, 41, pp. 21-56.

For abstract see *Helv. Abs.*, 21, No. 489a.]

489—Protoplasma.

a. SCHWÖBEL, W., 1952.—"Untersuchungen zur Granulabewegung im Ei von *Parascaris equorum* (Goeze) mit Hilfe des Zeitrafferfilms." 41 (1), 21-56.

(489a) Schwöbel has studied the movement of protoplasm inclusions in intact cells, using as test material *Parascaris equorum* ova. By making use of the intermittent motion film technique he has been able to observe this very slow "granular movement" which is not otherwise distinguishable. Results are set out in very great detail and a review of earlier work is included. A.E.F.

55—Science.

a. SCOTT, A. C., 1938.—"Cleaving nematode eggs as research and classroom material." 87 (2250), 145-146.

627—Communications de la Faculté des Sciences de l'Université d'Ankara.

a. SENGÜN, A., 1949.—"Über das Verhalten der Chromosomen in den wachsenden Oocyten von *Ascaris megalocephala univalens*." 2, 89-109.

5163—SEY, O., 1971. "Gametogenesis in *Paramphistomum microbothrium* Fischöder, 1901." *Acta vet. hung.*, 21 (1), 93-106.

The anatomy of the genitalia of *Paramphistomum microbothrium*, and gametogenesis and fertilization are described. There are 3 spermatogonial and 2 spermatocytic stages. The cells produced by successive divisions of each primordial spermatogonium remain together in a rosette of 32 spermatids connected by cytoplasmic bridges. The spermatids develop into spermatozoa each with a long flagellum. Oocytes are released from the ovary and fertilized in the proximal region of the uterus. After penetration, the spermatozoon becomes shorter and thicker. 2 polar bodies are produced by 2 divisions of the oocyte. After a short resting period following the formation and fusion of the male and female pronuclei, unequal cleavage of the zygote occurs. The eggs discharged by mature worms contain either an undivided zygote or are in the 2 to 8 cell stage. The diploid number of chromosomes is 14 of which 6 are in metacentric, 5 in subcentric and 3 in acrocentric locations. [A.S.] A.J.

1503—SHEFFIELD, H. G., 1962. "Electron microscopy of the bacillary cells of *Trichuris muris* (Schränk, 1788)." [Abstract.] *Journal of Parasitology*, 48 (2, Sect. 2), 42.

The fixation, embedding and section cutting techniques are briefly reported. Bacillary cells are elongate and bordered by a basement membrane. At the apical end the bacillary cells end in a cuticular pore. An endoplasmic reticulum extends from the cuticular pore to an area of high mitochondrial concentration near the nucleus. The plasma membrane at the basal end of the cell is highly folded and occasional glycogen masses are seen adjacent to it. M.B.-B.

541—SHEFFIELD, H. G., 1963. "Observations on the fine structure of the stichosome and bacillary band of *Trichuris muris* (Schränk, 1788) and *Trichuris vulpis* (Froelich, 1789)." *Dissertation Abstracts*, 23 (11), 4477.

The anterior ends of adult *Trichuris muris* and *T. vulpis* were fixed for 30 minutes in buffered osmic acid plus sucrose, dehydrated and embedded in Selectron-methacrylate or butylmethyl methacrylate. The gross structure of the stichosome and the bacillary band as observed by electron microscopy of sections of this material is generally like that described by other workers using the light microscope. The fine structure, which is described, indicates that the stichocytes and bacillary band are secretory in function. J.W.S.

3035—SHEFFIELD, H. G., 1963. "Electron microscopy of the bacillary band and stichosome of *Trichuris muris* and *T. vulpis*." *Journal of Parasitology*, 49 (6), 998-1009.

The bacillary band of *Trichuris muris* and *T. vulpis* consists of columnar cells with a folded basal membrane that underdigitates with adjacent cells. The cytoplasm of the cells is filled with RNP particles and a fine reticulum. The apical part of each cell contains mitochondria and a system of lamellae. The pore is filled with homogeneous material that may be secretory. The stichosome and oesophagus are surrounded by a membranous sheath of several layers. The central nucleus has fine blebs on its surface. Granules and large vesicles with connecting canaliculi occur in the cell. The lumen of the oesophagus is enclosed by tubular cells. It is suggested that the stichocyte has a secretory function. R.C.A.

790—Dissertation Abstracts.

- c. SHERMAN, H. J., 1955.—"The germ cell cycle of *Paramphistomum microbothrioides* Price and McIntosh." 15 (11), 2355.

(790c) Sherman has studied experimentally the germ cell cycle in *Paramphistomum microbothrioides* in its intermediary, *Stagnicola cubensis*. No satisfactory technique for sectioning the eggs was developed. The embryology of the redia was studied from the first cleavage to the fully formed redia. The early development of the cercaria was the same as that in the redia. At no time were maturation divisions observed in the larvae and there were no indications of gonads in the larval stages. In each case the germinal cell is set aside at the first cleavage; it continues to divide infrequently and adds, in the redia, to the somatic tissue. The abstract states that a description of the embryology of the cystogenous cells, intestine, excretory system, nervous system, pigmentation, eye and acetabulum in the cercaria is given in the dissertation. S.W.

578—Journal of Parasitology

- 7k. SHORT, R. B., 1955.—"Chromosomes and sex determination in *Schistosomatium douthitti* (Trematoda: Schistosomatidae)." 41 (6, Sect. 2), 24.

(578k) In *Schistosomatium douthitti* cercariae the diploid chromosome number 14 in each sex. The male is AAZZ and the female is heterogametic with AAZW. R.T.L.

242—Journal of Heredity.

- a. SHORT, R. B., 1957.—"Chromosomes and sex in *Schistosomatum douthitti*. Trematoda: Schistosomatidae." 48 (1), 3-6.

(242a) From a study of the chromosomes of cercariae of known sex, Short has shown that the female of *Schistosomatum douthitti* is heterogametic for sex. The diploid chromosome number in both sexes is 14 and all the chromosomes are identifiable morphologically. The female possesses one heteromorphic pair (ZW). In a male triploid the components were ZZW whereas a female triploid was ZWW, indicating that the W chromosome is not strongly female-determining. It is possible that sex determination is in accordance with Bridges' genic balance theory. S.W.

578—Journal of Parasitology

11. SHORT, R. B. & MENZEL, M. Y., 1955.—"Chromosomes in parthenogenetic miracidia of *Schistosomatum douthitti* (Trematoda: Schistosomatidae) and their progeny in snails." 41 (6, Sect. 2), 24-25.

(5781) Haploid miracidia of the chromosome constitution AZ develop, at least, into large cercariae. AW ova apparently do not survive. Probably diploid parthenogenetic males (AAZZ) result from doubling the chromosome number of AZ egg cells or miracidial embryos and diploid parthenogenetic females (AAZW) from unreduced eggs. R.T.L.

- 273—SHORT, R. B. & MENZEL, M. Y., 1959. [Florida State University, U.S.A.] "Chromosomes of schistosomes." [Abstract.] *Journal of Parasitology*, 45 (4, Sect. 2), 15.

- 563—SHORT, R. B. & MENZEL, M. Y., 1959. "Chromosomes in parthenogenetic miracidia and embryonic cercariae of *Schistosomatum douthitti*." *Experimental Parasitology*. New York, 8 (3), 249-264.

Short & Menzel have studied the chromosomes of *Schistosomatum douthitti* miracidial embryos from unfertilized eggs in unisexual infections and eggs in bisexual infections and of cercarial embryos from parthenogenetic miracidia. Of 168 miracidial embryos from unfertilized eggs 160 had a haploid X set of chromosomes, three a diploid XX and in five the constitution could not be determined. In miracidial embryos from bisexual infections four of the 153 examined had a haploid X set, 69 had diploid XX, 78 diploid XY, one triploid XXY and one triploid XYY. In the cercarial embryos the following were observed: of ten male infections three were haploid X, six were normal diploid XX and in embryos from one snail both haploid X and diploid XX occurred; of seven female infections all were normal XY diploids except one which was trisomic for the smallest chromosome. S.W.

- 274—SHORT, R. B. & MENZEL, M. Y., 1960. [Department of Biological Sciences, Florida State University, Tallahassee, Florida, U.S.A.] "Chromosomes of nine species of schistosomes." *Journal of Parasitology*, 46 (3), 273-287.

Short & Menzel describe and picture the chromosomes in nine species of schistosomes belonging to six genera, namely, *Schistosomatum douthitti*, *Schistosoma mansoni*, *S. haematobium*, *S. japonicum*, *Ornithobilharzia emaculata*, *Trichobilharzia physellae*, *T. stagnicolae*, *Austrotrichobilharzia variglandis* and *Gigantobilharzia huronensis*; and present idiograms for all nine species. This work constitutes the first on chromosomes in *Ornithobilharzia*, *Trichobilharzia*, *Austrotrichobilharzia* and *Gigantobilharzia*. The authors discuss the bearing of their findings on the taxonomy and evolution of the forms involved and predict that, while analysis of the mitotic chromosomes is not likely to be helpful in solving problems of schistosome taxonomy and phylogeny, study of the meiotic chromosomes may well aid considerably in this field. J. M. Watson

590—Research Bulletin of the Panjab University, Hoshiarpur.

- b. SINGH, S., 1957.—"On the direct origin of the refringent granules from the Golgi spheroids in the spermatogenesis of the nematode, *Polydelphis* sp." No. 119 (Zoology), pp. 383-388.

(590b) Singh studied spermatogenesis, by means of phase-contrast microscopy, in a *Polydelphis* sp. and obtained results which strongly suggest that the refringent granules have a direct origin from the Golgi spheroids. He reports that towards the end of spermatogenesis the refringent granules fuse to form the horseshoe-shaped acrosome of the sperm. The mitochondria do not form a nebenkern, and lie in the swollen part of the flask-shaped sperm in front of the nucleus. The sperm reaches full maturity in the uterus of the female. W.G.I.

86—Experimental Parasitology. New York.

- c. SMYTH, J. D., 1956.—“Studies on tapeworm physiology. VIII. Occurrence of somatic mitosis in *Diphyllobothrium* spp. and its use as a criterion for assessing growth *in vitro*.” 5 (3), 260–270.

(86c) Smyth has devised a technique by which he has demonstrated somatic mitosis in plerocercoid larvae of *Diphyllobothrium* spp. All the conventional phases from prophase to telophase were observed. By adding colchicine at a concentration of 10^{-4} to Tyrode and incubating the larvae in this solution for five hours, spindle formation is prevented and the chromosomes do not separate after prophase splitting. Larvae are removed, fixed in aceto-orcein and squash preparations examined. After observing the colchicine-treated material he became familiar with the small size of the nuclei (2μ) and expected size and appearance of the chromosomes and confirmed his observations on untreated material. Somatic mitoses were not seen in sections of material treated with colchicine and fixed by routine methods but could be discerned in sections fixed and swollen by aceto-orcein fixation. Observations on the number of mitoses per 30 oil immersion fields (taking 10 per 30 fields as a tentative growth threshold) indicated that larvae can be considered to be merely surviving and not growing after three days' cultivation. In spite of the high experimental error in the counting procedure this technique is potentially a useful criterion between growth and survival in helminth culture work. S.W.

- 1574—SMYTH, J. D., 1962. “The chromosome number of *Echinococcus granulosus*.” *Journal of Parasitology*, 48 (4), 544.

As adult strobilae with testes were not available the somatic cells of the protoscolices were examined to determine the chromosome number of *Echinococcus granulosus*. The number of mitoses per organism can be greatly increased by culturing in highly nutrient media, e.g. 10% beef embryo extract in hydatid fluid for 2 days at 37°C. Preliminary hypotonic treatment in 20% Hank's for 10 min. at 37°C. followed by aceto-orcein for 15 min. at 37°C. gave the best results for observation. The diploid chromosome number of *E. granulosus* is 18, the largest pair under the above staining conditions measured just over one micron long. The somatic preparations did not yield a reliable idiogram. M.B-B.

- 2318—SWARTZ, F. J., HENRY, M. & FLOYD, A., 1967. “Observations on nuclear differentiation in *Ascaris*.” *J. exp. Zool.*, 164 (2), 297–307.

The amounts of DNA found in nuclei of *Ascaris*, estimated by microdensitometry, were compared with values expected as a result of somatic chromatin diminution. The diploid amount was obtained from Feulgen-stained nuclei of sperm and unreduced primary oocytes. The amounts of DNA for somatic nuclei were: (i) in intestinal cells—within the tetraploid range; (ii) in uterine epithelium, pharyngeal glands and excretory cells—high degrees of polyploidy, with a peak of 150-ploid in the posterior half of the uterine epithelium decreasing towards both ends and (iii) in muscle and ganglia—negative, and so most likely to represent nuclei which remained in the original diminished condition. W.P.R.

- 3271—SWIDERSKI, Z., 1968. “Electron-microscopy of embryonic envelope formation by the cestode *Catenotaenia pusilla*.” *Expl Parasit.*, 23 (1), 104–113.

Electron photomicrographs of the developing embryo of *Catenotaenia pusilla* reveal 5 main embryonic envelopes, namely, capsule, outer envelope, inner envelope, embryophore and oncospherical membrane. The capsule persisted during all stages of embryonic development. The inner envelope and embryophore are formed separately and have a cellular origin from the embryo proper. The inner envelope is formed by blastomeres, the nuclei of which appear to correspond to the “third macromere”. The embryophore is formed by typical mesomeres. J.W.S.

†3627—SWIDERSKI, Z., 1968. "An electron microscopic evidence of the degeneration of some micromeres during the embryonic development of the cestode *Catenotaenia pusilla* (Goeze, 1782) (Cyclophyllidea, Catenotaeniidae)." *Zoologica Pol.*, 18 (4), 469-473. [Polish & Russian summaries.]

Portions of strobila of *Catenotaenia pusilla*, showed degenerating micromeres within the blastomeres of pre-oncospherical stages. Nuclear shrinkage, elimination of cytoplasm and absence of mitochondria are briefly cited as evidences of degeneration. K.A.W.

3009—SWIDERSKI, Z., 1970. "An electron microscope study of spermatogenesis in cyclophyllidean cestodes with emphasis on the comparison of fine structure of mature spermatozoa." [Abstract.] *J. Parasit.*, 56 (4, Sect. 2), (Int. Congr. Parasit. (2nd), Washington, D.C., Sept. 6-12, 1970, Proceedings, Part I), p. 337.

[*Catenotaenia pusilla*, *Inermicapsifer madagascariensis* and *Hymenolepis microstoma*.]

538—SZIDAT, L., 1971. [New aspects of the *Echinococcus* problem.] "Neue Aspekte des Echinococcen-Problems." *Angew. Parasit.*, 12 (3), 133-143. [English & Russian summaries p. 142.]

The morphology and biology of 6 South American species of *Echinococcus*, including *E. pampeanus*, *E. patagonicus* and *E. cepanzoi*, are reviewed and discussed. Information on the influence of host sex hormones on adult *Echinococcus* is given and it is suggested that castration of dogs may be a possible means of prophylaxis. The hypothesis of Smyth [see *Helminth. Abstr.*, 32, No. 1574] that owing to its very high chromosome number ($2n=18$) *Echinococcus granulosus* may be regarded as polyploid, is discussed and applied to 3 other species.

M.R.N.S.

2145—TADANO, M., 1961. [Studies on the mechanism of chromatin diminution in the egg of *Parascaris equorum* (Goeze).] *Japanese Journal of Parasitology*, 10 (5), 542-554. [In Japanese: English summary pp. 553-554.]

Chromatin diminution was studied in *Parascaris equorum* eggs subjected to rapid changes of temperature, or kept at variable temperatures, centrifuged and treated with lithium chloride, sodium thiocyanate, ammonia or ultra-violet rays. Of particular interest was the observation that when the ectoplasm was redistributed the somatic cell became the germ cell and vice versa. It appeared that the chromatin diminution was induced by a proteolytic enzyme derived from the ectoplasm and which had optimum activity at a pH range from neutral to weakly alkaline.

Y.Y.

554 TADANO, M.; TADANO, Y. [On the structural changes in egg cells during oogenesis in *Ascaris*, with reference to the cell-surface.] [Proc. 28th West Japan Reg. Meeting, Nagoya, Oct. 19, 1972. Abstract.] *Japanese Journal of Parasitology* (1973) 22 (2, Suppl.) 50 [Ja]

2146—TADANO, Y., 1961. [New formation and its mechanism of the egg membrane and the plasma membrane of ascaris egg.] *Japanese Journal of Parasitology*, 10 (5), 563-573. [In Japanese: English summary pp. 572-573.]

In studies on the eggs of *Parascaris equorum* and pig *Ascaris* Tadano refers to 5 layers in the egg membrane and to the plasma membrane. The structure, function and origin of some of the layers are discussed together with the removal of all layers using either antiformin alone or antiformin and "pronase".

Y.Y.

2565—TANDON, R. S., 1970. "Observations on the germinal development in the life cycle of the Indian liver fluke, *Fasciola indica* Verma, 1953." In: Singh, K. S.; Tandan, B. K. [Editors], "H. D. Srivastava commemoration volume." *Izatnagar, U.P.: Indian Veterinary Research Institute*, pp. 537-544. [En] Dept. of Zoology, University of Lucknow, India.

The germinal development of *Fasciola indica* from zygote to adult is described in detail. The first intermediate host is *Lymnaea acuminata* and experimentally infected guinea-pigs were used as definitive hosts. Development was found to conform to the general pattern in the order Fasciolatoidea and is compared with that of *Gastrothylax crumenifer*. A.J.

3258 TANEJA, S. K.; NATH, V. Morphological and cytochemical studies on the mitochondria in the spermatogenesis of an amphistome trematode, *Gastrothylax crumenifer*. *Research Bulletin of the Panjab University* (1971, publ. 1972) 22 (3/4) 409-416 [En] Dept. of Zoology, Panjab Univ., Chandigarh, India.

Studies of the fate of the mitochondria in spermatogenesis of *Gastrothylax crumenifer* indicate that most mitochondrial material passes into the tail of the mature sperm but some occurs in the head around the nucleus. The mitochondria contain lipid, protein and a PAS-positive carbohydrate. There is no PAS-positive acrosome because the Golgi complex is discarded with the residual cytoplasm at spermateleosis and it is suggested that the mitochondria have taken over the role of the acrosome.

AJ

3157—TAY, J., 1971. [Comparative study by electron microscopy of intestinal epithelia of *Ascaris lumbricoides* and *Fasciola hepatica*.] "Comparación al microscopio electrónico de los epitelios intestinales de *Ascaris lumbricoides* y de *Fasciola hepatica*." *Revista Latinoamericana de Microbiología*, 13 (2), 125-136. [Es, en] Dept. de Ecología Humana de la Facultad de Medicina de la UNAM, Mexico D.F.

The ultrastructure of the gastrodermis of *Fasciola hepatica* and *Ascaris lumbricoides* is described by means of 11 electronmicrographs and comparisons are made. The various organelles observed are described.

P.S.G.

564—TAYLOR, A. E. R., 1960. "The spermatogenesis and embryology of *Litomosoides carinii* and *Dirofilaria immitis*." *Journal of Helminthology*, 34 (1/2), 3-12.

By means of phase contrast, ultra-violet and fluorescence microscopy, Taylor has studied the embryology of *Litomosoides carinii* and *Dirofilaria immitis* and, for the first time in any filarial worm, spermatogenesis. In general, spermatogenesis is similar to that described for other nematodes but the spermatozoa in both species are remarkable in that their chromosomes persist during their maturation. Both species have spermatozoa with four and five chromosomes but neither shows polymorphism of the spermatozoa connected with the different chromosome numbers. The possibility of there being an "XO" and "XX" sex determining mechanism as in many other nematodes is discussed, the females in this case possessing one more chromosome than the males. The eggs, first cleavage, blastula and microfilaria are described, the eggs being smaller than in most nematodes. The genital primordia do not appear until the second-stage larva is reached. The desoxyribonucleic acid and ribonucleic acid content and distribution in the developing embryos are discussed. The paper is illustrated by 37 photo-micrographs.

s.w.

228—Dissertation Abstracts.

- b. TAYLOR, C. R., 1958.—"A study of the method of reproduction occurring in the redia of *Proterometra macrostoma* Horsfall (1933)." 18 (3), 1167.

(228b) Morphological examination of the cells of the redia and cercaria of *Proterometra macrostoma* indicated that, whereas the cercaria is bisexual, the redia is not a sexual generation. Neither maturation figures nor polar bodies were observed in any of the cells of the redia; but gametogenesis was observed in the gonads of the cercaria. Histochemical staining and cytophotometric measurements of the desoxyribonucleic acid content of the nuclei of the cells (using the method of Patau, 1952), confirmed that the redia exhibited no evidence of sexuality.

J.M.W.

163—Transactions of the American Microscopical Society.

- a. TERHAAR, C. J., 1955.—"On the cytology of certain cells of the cestode, *Hydatigera taeniaeformis* (Batsch, 1786)." 74 (2), 159-163.

(163a) Terhaar, studying the cytology of *Hydatigera* [*Taenia*] *taeniaeformis* has demonstrated mitochondria and Golgi material in the parenchymal cells and in the muscle cells of the parenchyma. Mitochondria and a round nuclear inclusion which stained brilliant red with Altmann's technique occurred in the subcuticular cells but no Golgi material was present.

S.W.

- 2147—TERRY, A., TERRY, R. J. & WORMS, M. J., 1961. "*Dipetalonema witei*, filarial parasite of the jird, *Meriones libycus*. II. The reproductive system, gametogenesis and development of the microfilaria." *Journal of Parasitology*, 47 (5), 703-711.

The authors describe the reproductive system of *Dipetalonema witei* (synonym *D. vite*), giving notes on gametogenesis and the development of microfilariae, having stained sections with Giemsa's stain or haematoxylin and eosin. The reproductive tracts are similar to those described for other *Spirurina* except that neither gonad has a rachis and the testis lacks a flexure. The spermatozoa contain five or six chromosomes which remain separate. Two polar bodies and the vitelline membrane are formed soon after fertilization.

R.C.A.

- 3127—THOMAS, H., 1965. "Beiträge zur Biologie und mikroskopischen Anatomie von *Trichinella spiralis* Owen 1835." *Z. Tropenmed. Parasit.*, 16 (2), 148-180. [English summary p. 179.]

A very detailed, illustrated account is given of the anatomy and development of muscle and intestinal *Trichinella spiralis* in mice. Periods of growth, processes of moulting and details of reproduction are outlined. The growth and formation of the entire female and male genital apparatus are described; the complicated male cloaca is of particular interest. The formation and feeding of germ cells, spermatogenesis and oogenesis, fertilization and chromosome numbers (diploid = 6, haploid = 3) are also studied.

G.I.P.

- 2373—THORSELL, W. & BJÖRKMAN, N., 1965. "On the fine structure of the Mehlis gland cells in the liver fluke, *Fasciola hepatica* L." *Z. Parasitenkunde*, 26 (1), 63-70.

Cells of Mehlis' gland in *Fasciola hepatica* were studied by light and electron microscopy. The large cells in the periphery of the gland show ultrastructural evidence of secretory activity (probably holocrine). The small cells in the centre are of a primitive type; a large number of mitochondria indicate a high metabolic activity.

T.Y.

- 2149—THREADGOLD, L. T., 1963. "The ultrastructure of the 'cuticle' of *Fasciola hepatica*." *Experimental Cell Research*. New York, 30 (1), 238-242.

[A full account of this work was published in *Q. Jl microsc. Sci.*, 1963, 104, 505-512; for abstract see *Helm. Abs.*, 34 (2), No. 1404.]

1879—THREADGOLD, L. T. & IRWIN, S. W. B., 1970. "Electron microscope studies of *Fasciola hepatica*. IX. The fine structure of Mehlis' gland." *Z. ParasitKde*, 35 (1), 16-30.

Mehliss' gland of *Fasciola hepatica* is composed of 2 secretory cell types supported by parenchymal cells. The products of the secretory cells are carried by means of cytoplasmic extensions into the ootype. The most prevalent type of secretory cell is termed S₁ type. It possesses many narrow granular endoplasmic cisternae and numerous Golgi complexes. The secretory bodies of this cell resemble slightly curved sausages and have a filamentous content radiating from a central core. The other secretory cell type is termed S₂ type. It is characterized by distended granular endoplasmic cisternae and numerous Golgi complexes which give rise to round dense secretory bodies with a crystalline or packed fibrous appearance. Both types of secretory cells are penetrated deeply by invaginations of interstitial material. The cytoplasmic extensions from the cells are lined with microtubules and anchored to the epithelial cells lining the ootype by septate desmosomes. The secretory bodies of both cell types are released into the lumen of the ootype, where they disintegrate. [A.S.] A.J.

265—Proceedings of the Helminthological Society of Washington.

j. TIMM, R. W., 1951.—"A note on the cell inclusions of *Syringolaimus smarigdus* Cobb, 1928." 18 (2), 125-126.

(265j) The bright green intestinal cell inclusions observed by Cobb in the marine nematode *Syringolaimus smarigdus* are due to pigment from the filamentous green alga which forms a thick felt over the orange alga which encrusts the shell of the common mud snail *Nassa obsoleta* and in which the nematodes occur in great abundance. R.T.L.

1265 TOBLER, H.; SMITH, K. D.; URSPRUNG, H. Molecular aspects of chromatin elimination in *Ascaris lumbricoides*. *Developmental Biology* (1972) 27 (2) 190-203 [En] Dept. of Biology, Johns Hopkins Univ., Baltimore, Maryland 21218, USA.

DNA from spermatids, 4-cell stages and larvae of *Ascaris lumbricoides* was isolated and the genome size before and after chromatin elimination was determined by isotope dilution. According to these determinations, 27% of the DNA was lost during chromatin elimination. The genomes were then characterized by CsCl equilibrium density gradient centrifugation and renaturation kinetics. The eliminated DNA did not differ from the retained DNA in base composition. CWG

2086—TOKIN, I. B., 1957. [Laboratoriya elektronnoi mikroskopii, Akademiya nauk SSSR, Moskva, U.S.S.R.] [Electron microscope examination of basophilic structures in *Parascaris equorum*.] *Dokladi Akademii Nauk SSSR*, 116 (3), 497-500. [In Russian.]

The fine structure of *Parascaris equorum* oocytes was studied by electron microscopy. It was found that: (i) with the accumulation of basophils the cytoplasm appeared rich in ultra-microscopic structures whose nature and form is expressed in the term "ergastoplasmic net"; (ii) chondriosomes were abundant and of characteristic structure; (iii) the observed polymorphism of the chondriosomes could be considered as stages in their formation; (iv) different types of chondriosome division occurred. Close topographic relationships of young chondriosomes with the ergastoplasmic apparatus were observed, suggesting the participation of the ergastoplasm in the new formation of chondriosomes. G. I. Pozniak

337—TRANTAPHYLLOU, A. C., 1960. [North Carolina State College, U.S.A.] "Variation, post-infection development and sex determination in *Meloidogyne incognita*, and oogenesis in some *Meloidogyne* species." *Dissertation Abstracts*, 20 (8), 3014-3015.

727—TRIENTAPHYLLOU, A. C., 1962. "Oögenesis in the root-knot nematode *Meloidogyne javanica*." *Nematologica*, 7 (2), 105-113. [German summary p. 113.]

Trientaphyllou describes in detail the cell divisions in the ovary leading to the formation of oocytes and their maturation divisions in 10 isolates of *Meloidogyne javanica*. In maturation there is a single mitotic division with the formation of one polar nucleus which remains in the cytoplasm. There is no synapsis and the chromosome number remains unchanged. The first cleavage division of the egg usually takes place after it is laid. In populations where many males were present sperm was often seen in the spermatheca and one entered each oocyte as it passed through. Fusion of sperm nucleus with egg pronucleus was never seen. It is concluded that the main and perhaps the only mode of reproduction is by ameiotic parthenogenesis. Chromosome numbers ranged from 48 in 4 of the isolates from U.S.A. to 43 in one from England, with 44 and 46 in 2 and 3 respectively of the other isolates. It is suggested that *M. javanica* is a polyploid, but as the basic chromosome number for the genus is not known the degree of polyploidy cannot be ascertained.

M.T.F.

3036—TRIENTAPHYLLOU, A. C., 1963. "Polyploidy and parthenogenesis in the root-knot nematode *Meloidogyne arenaria*." *Journal of Morphology*, 113 (3), 489-499.

Trientaphyllou studied oögonial and maturation divisions in 13 populations of *Meloidogyne arenaria*. There was no evidence of synapsis in the maturation division but the 2 constituent chromatids of each chromosome were seen to separate. As in *M. javanica* there was only one maturation division and the first cleavage in the egg normally took place outside the female body. In 3 of the populations chromosome counts gave mostly 36 with a few from 34 to 37 and in the other 10 there were from 51 to 54, suggesting that the basic number of chromosomes is 9 and the populations are either tetraploid or hexaploid. 2 of the tetraploid populations produced no males but the other tetraploid and all the hexaploid populations produced males when conditions were crowded, as in *M. incognita*. Reproduction was by mitotic parthenogenesis in the absence of males. When males were present they were found in the egg sacs but insemination was rare. When it did occur one spermatoozon entered the oocyte at late prophase or early metaphase of the maturation division: it remained close to one pole of the egg but was not seen to fuse with the egg pronucleus. Division proceeded without reduction in chromosome number, as in non-seminated females. Spermatogenesis appeared to be similar to oogenesis but it was impossible to count the chromosomes. Ability of *M. arenaria* to reproduce on peanut (*Arachis hypogaea*) is used as a means of separating the subspecies *M. arenaria thamesi*, which does not, from *M. arenaria arenaria*, which does reproduce on this plant. Of the 13 populations used by Trientaphyllou 3 reproduced (one lightly) on peanut and 10 did not. One of the successful populations was tetraploid the others hexaploid. It is deduced that the chromosome number is not correlated with ability to reproduce on peanut nor with the separation into subspecies. The author concludes that the available cytological information explains and justifies the taxonomic difficulties of the group.

M.T.F.

728—TRIENTAPHYLLOU, A. C. & HIRSCHMANN, H., 1962. "Oögenesis in *Meloidogyne javanica* and *M. arenaria*." [Abstract of paper presented at the 53rd Annual Meeting of the American Phytopathological Society, 1961.] *Phytopathology*, 52 (1), 30.

Oocyte development, fertilization and cleavage were observed in both *Meloidogyne javanica* and *M. arenaria*. The number of chromosomes varied in different populations of the same species. Two form groups of *M. arenaria* are distinguishable, one with 34 and 37 and the other with 51 and 54 chromosomes. It is suggested that the variation within *M. javanica* or within each of the 2 groups of *M. arenaria* may represent different forms of aneuploidy and that the over-all variation may represent various degrees of polyploidy.

J.W.

1712—TRIENTAPHYLLOU, A. C. & HIRSCHMANN, H., 1966. "Gametogenesis and reproduction in the wheat nematode, *Anguina tritici*." *Nematologica*, 12 (3), 437-442. [German summary p. 441.]

Oögenesis and spermatogenesis in *Anguina tritici* follow the classical pattern common in diploid amphimictic animals. Gonial cell multiplication occurs in the germinal zone of the gonads through regular mitotic divisions. Following a period of growth, oocytes and spermatocytes undergo 2 regular maturation divisions. Fusion of sperm and egg pronuclei takes place regularly. The somatic chromosome number is 38 in both sexes. No sex chromosomes could be distinguished.

[A.S.] D.W.L.

2553—TRIENTAPHYLLOU, A. C. & HIRSCHMANN, H., 1968. "Cytology and reproduction of *Helicotylenchus dihystra* and *H. erythrinae*." *Nematologica*, Year 1967, 13 (4), 575-580. [German summary p. 580.]

Several populations of the monosexual species *Helicotylenchus dihystra* from the U.S.A. were studied with respect to their chromosomal complement and mode of reproduction to clarify the question of digonic hermaphroditism. No synapsis of homologous chromosomes takes place and maturation consists of a single mitotic division. The somatic chromosome number observed at anaphase or telophase of the maturation division and at prometaphase of the first cleavage division was $2n=38$ in 2 populations from North Carolina (with possible variation from 38 to 40), $2n=34$ in one population from North Carolina, and $2n=30$ in 2 populations from Wisconsin. Cleavage proceeded without fertilization. Reproduction in *H. dihystra* is, therefore, by mitotic parthenogenesis; there is no evidence of hermaphroditism. Cytology and reproduction were also studied in a single population of the bisexual species *H. erythrinae* from North Carolina. Synapsis of homologous chromosomes takes place and maturation is normal, consisting of 2 divisions. The somatic chromosome number observed at prometaphase of oögonial divisions is $2n=10$ and the reduced chromosome number seen at anaphase of the first maturation division and metaphase of the second maturation division of oocyte is $n=5$. Re-establishment of the somatic chromosome number takes place through fertilization. No substantial differences in size and shape of the chromosomes of these 2 species were observed. This is interpreted as indicating the existence of polyploidy in *H. dihystra*.

[A.S.] S.W.A.

246—Journal of Parasitology

- y. TROMBA, F. G. & STEELE, A. E., 1957.—“The chromosomes of *Stephanurus dentatus* (Nematoda: Strongyloidea).” 43 (5), 590.

(246y) In *Stephanurus dentatus* the diploid number of chromosomes is eleven in the male and twelve in the female. R.T.L.

398—Journal of Parasitology

- dk. TULLOCH, G. S. & SHAPIRO, J. E., 1957.—“The ultra structure of the vitelline cells of *Haematococcus*.” 43 (6), 628–632.

- 1359—TULLOCH, G. S., SHAPIRO, J. E. & HERSHENOV, B., 1961. “Protoplasmic processes of epithelial cells of *Gorgodera*.” *Journal of Parasitology*, 47 (3), 509–511.

Photomicrographs of the sperm ducts and uteri of *Gorgodera amplicava* from *Rana pipiens* show the presence of protoplasmic processes in the form of loops, circular in cross section and measuring 0.035μ in diameter, which arise from the epithelia and project into the lumina. Similar protoplasmic processes are occasionally seen on young eggs. The processes probably permit greater molecular transfer by increasing surface area but whether they are absorptive or secretive in function is not yet known. J.W.S.

- 2574—TUZET, O.; KTARI, M. II., 1971. [Spermiogenesis and the morphology of the spermatozoon of *Microcotyle mormyri* Lorenz, 1878 (Monogenea).] “La spermiogenèse et la structure du spermatozoïde de *Microcotyle mormyri* Lorenz, 1878 (Monogenea).” *C. r. hebdomadaire des séances de l'Académie des Sciences, Paris*, 272, 2702–2705. [Fr]

Spermiogenesis and the morphology of the spermatozoon has been studied in *Microcotyle mormyri* from the gills of *Pagellus mormyrus* in the Gulf of Tunis. The sperm is filiform and limited by a sheath of microtubules. Anteriorly, there are 2 centrioles from which arise 2 intracytoplasmic flagellae which pass alongside the nucleus to the posterior extremity of the sperm to separate into 2 distinct flagellae. During spermiogenesis, the dictyosome does not form an acrosome but instead degenerates. In front of the centrioles, there are flagellary rootlets which have a banded appearance. The centrioles are united at the base of the rootlets by a structure which consists of 2 outer lateral electron-dense bands separated from a central electron-dense band by 2 electron-lucid bands. This is not present in mature sperms. A.J.

668—Archives de Zoologie Expérimentale et Générale.

- a. TUZET, O. & SANCHEZ, S., 1951.—“Sur l'acrosome du spermatozoïde de l'*Ascaris*.” *Notes et Revue* No. 3, 88 (3), 142–148.

543—UDE, J., 1962. "Neurosekretorische Zellen im Cerebralganglion von *Dicrocoelium lanceatum* St. u. H. (Trematoda-Digena)." *Zoologischer Anzeiger*, 169 (11/12), 455-457.

51—Transactions of the American Microscopical Society.

- a. VAN CLEAVE, H. J., 1951.—"Giant nuclei in the subcuticula of the thorny-headed worm of the hog (*Macracanthorhynchus hirudinaceus*)."

70 (1), 37-46.
(51a) In *Macracanthorhynchus hirudinaceus* the spheroidal embryonic nuclei of the syncytium which is to become subcuticle, measure only about 0.01 mm. in diameter but these nuclei increase 500 times in diameter in the modified nuclear threads characteristic of the subcuticle of the adult. The evolutionary significance of the form changes of these giant nuclei in the Acanthocephala is discussed.
R.T.L.

789—Archives Néerlandaises de Zoologie. Leiden.

- a. VAN DEN BROEK, C. J. H., 1940.—"Die Rolle der Golgi-Körper bei den jüngsten Stadien der Oogenese bei *Ascaris lumbricoides*." 4 (2/3), 358-359.

6—American Midland Naturalist.

- a. VAN DER WOUDE, A., 1954.—"Germ cell cycle of *Megalodiscus temperatus* (Stafford, 1905) Harwood, 1932 (Paramphistomidae: Trematoda)." 51 (1), 172-202.

(6a) Van der Woude describes the fixing and staining techniques used in her study of the germ cell cycle of *Megalodiscus temperatus*. She gives a detailed account of gametogenesis which is similar to that described in other digenetic trematodes. Two polar bodies are formed during maturation of the ovum and the diploid chromosome number is eighteen. Fusion of the pronuclei and development of the miracidium takes place while the eggs are in the uterus. The first cleavage is unequal and results in a large ectodermal and a small propagatory cell; only the ectodermal cell continues to divide until about the eight to ten-cell stage when the propagatory cell divides into a large and a small cell both of which continue to divide but in a different way. By the time the miracidium is developed the propagatory cell has given rise to ectodermal cells, which form the soma of the first generation redia, and germinal cells which remain in the posterior end of the redia and will in turn give rise to second, third and possibly more generations of rediae. The cercariae develop from germinal cells in a similar fashion and it is only in the cercariae that the germinal cells multiply to form the genital primordium which develops into ovaries, testes and the accessory reproductive structures. There is no indication of the formation of gonads or any sign of maturation in the earlier generations.
S.W.

2994—VALENTIN, J., 1965. "Evolution du chondriome dans les cellules dites 'phagocytaires' de *Parascaris equorum*." *C.r. hebd. Séanc. Acad. Sci., Paris*, 261 (21), 4498-4500.

The chondrioma of the pseudocoelomocytes of *Parascaris equorum* has been studied. It is exceptionally abundant throughout the cell; some of the mitochondria are small and retain the usual structure; others become enormous and undergo a peculiar development at the end of which they either fragment or empty their contents. Both intra- and extracapsular mitochondria and the processes they appear to undergo are described but it is not yet possible to interpret the intense activity of the chondrioma. Histochemical and biochemical observations are in progress.
S.W.

2575—VOGE, M.; JOHRI, G. N., 1970. "Observations on the nuclei of *Hymenolepis diminuta* oncospheres (Cestoda: Cyclophyllidae)." In: Singh, K. S.; Tandan, B. K. [Editors], "H. D. Srivastava commemoration volume." *Izatnagar, U.P.: Indian Veterinary Research Institute*, pp. 343-347. [En] Dept. of Medical Microbiology & Immunology, University of California, Los Angeles, USA.

The average number of nuclei within the hatched oncosphere of *Hymenolepis diminuta* is 26, although some may contain as many as 30. Most are situated in the anterior half of the oncosphere and are of 6 structural types. Type 1 (2 to 4 per oncosphere) are elongate and situated close to the surface. Type 2 (4 to 6) are subspherical or spherical, small and compact and with a well defined nuclear membrane. Type 3 (8 to 10) are subspherical or spherical and are identifiable as "germinative" nuclei. Type 4 (5 to 6) are the largest, with a delicate nuclear membrane and are situated relatively close to the surface. Type 5 (2) are situated close to each other in the anterior half and are sausage- or bean-shaped. Type 6 (2 to 3) are small and triangular in shape, and one is always at the extreme posterior end and the other close to the anterior end of the oncosphere.

C.W.G.

2464 VOGEL, M.; SEIDEL, J. S. Transformation *in vitro* of miracidia of *Schistosoma mansoni* and *S. japonicum* into young sporocysts. *Journal of Parasitology* (1972) 58 (4) 699-704 [En] Dept. of Medical Microbiology and Immunology, School of Medicine, Univ. of California, California, USA.

Eggs of *Schistosoma mansoni* and *S. japonicum* were hatched *in vitro* and behavioural changes and shedding of cilia of miracidia observed in solutions of different osmolarities and ionic content. Cessation of swimming occurred in solutions of osmolarities similar to or higher than that of *Biomphalaria* haemolymph. Shedding of cilia was observed only in media suitable for continued development. Variation in size and nuclear content of miracidia of *S. mansoni* and *S. japonicum* was studied. Organisms grown in axenic and monoxenic cultures shed their cilia, doubled in body size, and showed increases in numbers of large nuclei, with loss of terebratorium, and dedifferentiation of the nervous system. Differences in the behaviour *in vitro* of *Schistosoma mansoni* and *S. japonicum* are discussed. [AS].

CWG

6009—VOLINSKAYA, K. B., 1964. [Radiation studies of the morphogenetic function of nuclei of *Parascaris equorum* eggs.] *Trudy gel'mint. Lab.*, 14, 93-97. [In Russian.]

887—AN INTRODUCTION TO NEMATODOLOGY. Babylon, N.Y.
f. WALTON, A. C., 1940.—"Gametogenesis." Sect. 2, Part 1, pp. 205-215.

40—*Journal of Parasitology*.

a. WALTON, A. C., 1959.—"Some parasites and their chromosomes." 45 (1), 1-20.

(40a) Walton summarizes information on the chromosome numbers of a large number of parasites of different groups and comments on the taxonomic value of this data. W.P.R.

149—Naturwissenschaften. Berlin.

- a. WESSING, A., 1954.—"Beobachtungen über den Austritt von Chromatin in Plasma bei der Keimzellenreifung eines Nematoden." 41 (4), 95-96.

(149a) In the course of his study of the germ cells of *Rhabditis anomala* Wessing observed migration of chromatin from the nucleus into the plasma and back. This phenomenon, which had not previously been described, is discussed in this preliminary communication. A fuller account is to be published elsewhere. A.E.F.

316—Zeitschrift für Zellforschung und Mikroskopische Anatomie.

- a. WESSING, A., 1956.—"Untersuchung über das Vorkommen der Ribonukleinsäure (RNS) bei der Stammform und bei einer Dauermodifikation des Nematoden *Rhabditis anomala* P. Hertwig." 44 (1), 101-120.

(316a) Wessing has studied the occurrence and behaviour of ribonucleic acid in the sex cells of *Rhabditis anomala*. He describes the differences in this regard between the original strain of the worm and a modified form which developed after culturing for two years in the laboratory. The intensity of ribonucleic acid storage in the cytoplasm of *R. anomala* is dependent on the food intake of the worm. A.E.F.

- 2870—WESSING, A., 1957. "Die Entstehung und Bedeutung der Rhachis bei den Nematoden." Verhandlungen der Deutschen Zoologischen Gesellschaft. (Zoologischer Anzeiger, Supplementband 20), Year 1956, pp. 324-331.

This is a well illustrated account of the development and function of the rachis in *Rhabditis anomala*. In normal *R. anomala* of the original strain the egg cells remained solitary throughout their development, whereas in the modified form, which developed after two years' culture in the laboratory, a cytoplasmic connection appeared first between the first two oocytes then, on further modification, between progressively larger numbers of cells, finally giving rise to a rachis. It was evident that cytoplasm passed from the younger to the older but yet immature oocytes and it is thought that the younger cells provide nutrient material and help the older cells to reach the volume required for maturity. The mode of development of the rachis in *R. anomala* was briefly compared and found to be identical with that of *Parascaris equorum*. G.I.P.

141—Nature.

- a. WHITE, M. J. D., 1936.—"Chromosome cycle of *Ascaris megalocephala*." 137 (3471), 783.

- 5164—WHITFIELD, P. J., 1971. "Spermiogenesis and spermatozoan ultrastructure in *Polymorphus minutus* (Acanthocephala)." *Parasitology*, 62 (3), 415-430.

Spermiogenesis and spermatozoan morphology of *Polymorphus minutus* were studied by electron microscopy. Spermiogenesis occurs in syncytial clusters of spermatids exhibiting synchronous development. The outstanding events of the spermiogenic process are an enormous elongation of the spermatid nucleus and the eventual breakdown of the spermatid nuclear envelope. The mature spermatozoon is a filiform cell about 60μ long which moves by propagated undulations. It consists of 2 parallel elongate components, the single flagellum and the spermatozoan body. The former has a 9 + 2 tubule organisation and the latter contains glycogen granules and membrane-bound dense inclusions as well as a region of condensed chromatin of nuclear origin. No mitochondria appear to be present. [A.S.] A.J.

694—WIKGREN, B. J. P., 1964. "Studies on the mitotic activity in plerocercoids of *Diphylobothrium latum* L. (Cestoda)." *Commentat. biol.*, 27 (2), 1-33.

Using colchicine to arrest metaphases, the mitotic index (percentage of cells dividing at any given time) was calculated as 0.31% for plerocercoids of *Diphylobothrium latum* kept in culture media at 37°C. Metaphase accumulation (percentage of cells entering metaphase in one hour) was estimated as 3.2%. From these data mitosis was calculated to last 6 min. No marked diurnal rhythm in mitosis was detected. Different types of cell showed different mitotic activity and there was a correlation between mitotic activity and the distribution of glycogen. Mitosis decreased as carbohydrate was depleted. High temperatures greatly increased mitosis but cells frequently divided at 20°C. and there was even some cell division at 5 to 6°C. A new method for sterilizing plerocercoids is described and the use of colchicine to arrest metaphase is discussed. D.W.L.

695—WIKGREN, B. J. P., 1966. "The effect of temperature on the cell division cycle in diphylobothrid plerocercoids." *Acta zool. fenn.*, No. 114, 27 pp.

The subcuticular cells, flame cells and calcareous cells of plerocercoids of *Diphylobothrium osmeri* were found to be differentiated and constituted at least 42% of the cell population not undergoing mitosis. The frequency of mitotic stages in the parenchyma was 0.42 to 0.65%. The rate of entry of cells into mitosis varied from 0.1% at 10°C. to 1.9% at 38°C. Mitosis lasted from 223 min. at 10°C. to 13 min. at 38°C. The duration of mitosis in plerocercoids of *D. latum* was found to be similar to that in plerocercoids of *D. osmeri* at 38°C. and not as previously estimated. [See No. 694 above.] D.W.L.

2711—WIKGREN, B. J., 1966. "The chromosomes of *Diphylobothrium latum* and *D. osmeri*." [Abstract.] *Int. Congr. Parasit.* (1st), Rome, Sept. 21-26, 1964. Proceedings, Vol. I, pp. 555-556.

696—WIKGREN, B. J. P. & GUSTAFSSON, M. K. S., 1965. "The chromosomes of somatic cells of three *Diphylobothrium* species, with notes on the mode of cell division." *Acta Acad. Åbo.*, Ser. B; 25 (1), 1-12.

The karyotypes of somatic cells of *Diphylobothrium latum*, *D. osmeri* and *D. dendriticum* are apparently identical. The diploid number of chromosomes is 18 but haploid, near-haploid, sub-diploid and super-diploid numbers were found. Although some of this variation may be due to artefacts, aneuploidy is assumed to occur. The course of mitosis is conventional. Colchicine mitosis is briefly discussed. About 0.1% of somatic nuclei shows constrictions and strangulations and it is believed that some of these may lead to nuclear fragmentation. [A.S.] D.W.L.

1240—WIKGREN, B. J. P. & GUSTAFSSON, M. K. S., 1967. "Duration of the cell cycle of germinative cells in plerocercoids of *Diphylobothrium dendriticum*." *Z. ParasitKde*, 29 (3), 275-281.

The incorporation of tritiated thymidine into germinative cells in plerocercoids of *Diphylobothrium dendriticum* was studied by autoradiography. Thymidine was found to enter into the plerocercoids very rapidly: after only 5 minutes' incubation the germinative cells were labelled. The durations of the different parts of interphase were determined by pulse labelling. The mean length of one mitotic cycle was about 19 hours. The length of the various parts of interphase were approximately—G1, 6 hours; S, 10 hours and G2, 3 hours. The number of actively dividing cells in the inner parenchyma was determined by prolonged labelling. 39% of the cell population enters into the synthetic phase. This value indicates the size of the germinative cell population.

[A.S.] K.II.

2576—WIKGREN, B. J. P.; GUSTAFSSON, M. K. S., 1971. "Cell proliferation and histogenesis in diphylobothrid tapeworms (Cestoda)." *Acta Acad. Åbo.*, Ser. B, 31 (2), 10 pp. [En] Inst. of Biology, Åbo Akademi, Finland.

In *Diphylobothrium dendriticum* plerocercoids, germinative cells (free basophilic cells) constitute about 32% of the whole cell population. The distribution of cells in mitosis and of DNA-synthesizing cells closely corresponded to the distribution of these germinative cells. Electron microscopy showed the cells in colchicine-arrested mitosis to be identical to the germinative cells. The primary genital anlagen are formed by migration and mitosis of these cells. It is assumed that the germinative cells form a pool of proliferative cells from which the various specialized cells are drawn. [A.S.] C.W.G.

4331—WIKGREN, B. J. P., GUSTAFSSON, M. K. S. & KNUTS, G. M., 1971. "Primary anlage formation in diphylobothriid tapeworms." *Z. ParasitKde*, 36 (2), 131-139.

The primary or genital anlagen in the gull tapeworm, *Diphylobothrium dendriticum*, reared in the white rat, arise segmentally. They first appear as clusters of a few cells. At the site of anlage formation in the inner parenchyma, the dominating cells are germinative and dorsoventral muscle cells. In forming anlagen, there is no detectable increase of mitotic activity as compared with the surrounding parenchyma. In the initial stage, the anlage is composed of loosely packed germinative cells. Even in larger, growing anlagen the mitotic index is not significantly higher than in the parenchyma. However, the mitotically active cells are located in the periphery, mitosis being inhibited in the cells in the core. A comparison of cell density and number in the inner parenchyma in different regions of the neck indicates that the number of cells does not increase posteriorly, in spite of high cell division activity. It is concluded that anlagen are formed by aggregation of germinative cells.

[A.S.] A.J.

- 2577—WIKGREN, B. J. P.; KNUTS, G. M., 1970. "Growth of the subtegumental tissue in cestodes by cell migration." *Acta Acad. dbo.*, Ser. B, 30 (16), 6 pp. [En]

DNA-synthesizing cells in plerocercoids of *Diphylobothrium dendriticum* were labelled by incubation in a solution of H^3 -thymidine. The worms were then incubated in Parker's Medium 199 for 20 and 40 hours or reared in golden hamsters for 44 to 92 hours. Subtegumental cells did not incorporate the labelling although labelled cells did appear in the subtegument during growth. A migration of germinative cells within the cortical parenchyma and from this to the subtegument was observed. C.W.G.

- 3011—WIKGREN, B. J. P., KNUTS, G. M. & GUSTAFSSON, M. K. S., 1970. "Circadian rhythm of mitotic activity in the adult gull-tapeworm, *Diphylobothrium dendriticum* (Cestoda)." *Z. ParasitKde*, 34 (3), 242-250.

The mitotic activity of *Diphylobothrium dendriticum* reared in hamsters was studied 7 days after infection. The hamsters were either fed ad libitum, fed in the evening only, fed in the morning only, or starved for 24 hours. Starvation of the host drastically reduced mitotic activity in the worms. In all other experiments, the mitotic activity showed a circadian periodicity with peaks at 22.00 and 2.00 hours and minima at 10.00 to 18.00 hours. Worms from hamsters fed in the morning only, possibly had a 2nd peak some time after feeding. In the group of hamsters fed in the morning, the mitotic activity of the intestinal mucosa was also investigated. No circadian rhythm was observed. Evidently, availability of nutrients is essential to keep the mitotic activity at a high level. It is assumed, however, that the circadian periodicity also depends on other conditions besides nutrition. [A.S.] A.J.

109—Journal of Parasitology

- e. WILLEY, C. H. & GODMAN, G. C., 1951.—"Gametogenesis, fertilization and cleavage in the trematode, *Zygocotyle lunata* (Paramphistomidae)." 37 (3), 283-296.

(109e) Willey & Godman in their work on the germ cell cycle of *Zygocotyle lunata* have studied the behaviour of the nuclei and chromosomes during somatic divisions and gametogenesis. From each primary spermatogonium 32 thread-like spermatozoa with no visibly differentiated head are produced; reduction takes place during the last two divisions. A single entire spermatozoon penetrates each primary oöcyte in the oviduct and the ovum nucleus then undergoes maturation divisions, forming two polar bodies. Pronuclear union and the early cleavage divisions take place in the uterus behind the posterior testis. There is no evidence that the ovum receives nutrition from degenerating oöcytes. The authors consider that there is an early separation of a propagatory cell as reported for other trematodes but that the evidence is not yet conclusive. They describe the morphology of the chromosomes and find the diploid number to be 14. s.w.

- 1067—WINKLER, L. R., WONG CHI, L. & PELTIER, M. L., 1967. "A note on metamorphosis of spermatozoa in the oriental schistosome host snail *Oncomelania*." *Trans. Am. microsc. Soc.*, 86 (1), 60-61.

- 2087—WOLCOTT, G. B., 1959. [Laboratory of Tropical Diseases, National Institute of Allergy & Infectious Diseases, P.O. Box 717, Columbia, S. Carolina, U.S.A.] "The chromosomes of *Diphylobothrium ursi*." *Journal of Parasitology*, 45 (4), 378, 384.
Three specimens of *Diphylobothrium ursi* Rausch, 1954, a pseudophyllid naturally occurring in bears, were obtained from an experimentally infected dog and fixed in Carnoy. Reaction to Feulgen staining was weak but subsequent treatment of dissected uterus and testes with Cooper & Brink's carmine and haematoxylin combination gave good results. Clear figures of meiosis in the egg showed a haploid number of nine, four of the chromosomes being very small. There are one photomicrograph, one figure and three references. J. Mahon

222—Journal of Parasitology

- fg. WOODHEAD, A. E., 1953.—"Bisexual reproduction in the mother sporocyst of *Paragonimus kellicotti* (Trematoda)." 39 (4, Sect. 2), Suppl. p. 17.

(222g) In *Paragonimus kellicotti*, the mother sporocyst is a hermaphroditic adult and the generation is a true generation, for reduction occurs in both the male and female germ cells. The spermatids metamorphose into small oval cells with condensed nucleoli and little protoplasm. There are four-parted tetrads at the metaphase of the primary spermatocyte. When the stalked oögonium detaches from the germinal tissue, the nucleus divides and the micromere becomes a cap-cell. A sperm cell is taken in, making a cluster of three cells. The cap-cell divides to form a cellular cover to which the oöcyte and sperm cell attach. When 6-8 cells are present, the round sperm cell is detached. The primary oöcyte forms a metaphase plate and sets off polar body number one. This divides into polar bodies two and three. Polar body number two is set off and also becomes a nurse cell. When 40-80 nurse cells have been formed and the mass becomes oval, the male and female chromosomes meet on a spindle and embryological development of the mother redia begins. R.T.L.

† Abstract of paper presented at the 28th Annual Meeting, American Society of Parasitologists, Madison, Wisconsin, September 7-9, 1953.

46—Transactions of the American Microscopical Society.

- c. WOODHEAD, A. E., 1955.—"The germ cell cycle in the trematode family Brachylaemidae." 74 (1), 28-33.

(46c) From a study of whole mounts and sections of brachylaemid sporocysts which he obtained from a single snail, Woodhead concludes that reproduction in the Brachylaemidae is sexual in all generations. He describes and illustrates the different functional branches of the sporocyst, the oocytes, fertilized ova, stages in maturation divisions, spermatogonia, spermatocytes, spermatids and tailless sperms which he observed in the sporocysts. S.W.

46—Transactions of the American Microscopical Society.

- d. WOODHEAD, A. E., 1955.—"A study of the miracidium of *Gigantobilharzia huronensis* Najim, 1950, with special reference to the germinal cells." 74 (1), 33-37.

(46d) Woodhead has studied the morphology of the miracidium of *Gigantobilharzia huronensis*, basing his observations on 19 whole mounts fixed in Carnoy's solution and stained with Mallory's triple stain or Delafield's haematoxylin and eosin. He disagrees with some of Najim's observations made on living specimens and describes male and female germ cells. The male cells are enclosed in short or elongated packets or cords, the number at the time of hatching varying from four to eight. The female cells are located at the posterior end of the miracidium and are each attached by a stalk to the body wall; the number present varied from three to eight. S.W.

149—Transactions of the American Microscopical Society.

- a. WOODHEAD, A. E., 1957.—"Germ-cell development in the first and second generations of *Schistosomatium douthitti* (Cort, 1914) Price, 1931 (Trematoda: Schistosomatidae)." 76 (2), 173-176.

544—WOTTON, R. M. & SOGANDARES-BERNAL, F., 1963. "A report on the occurrence of microvillus-like structures in the caeca of certain trematodes (Paramphistomatidae)." *Parasitology*, 53 (1/2), 157-161.

The filose projections on the free surface of the epithelial cells lining the caeca of *Cleptodiscus kyphosi* and *C. reticulatus* are believed to be stereocilia or microvilli similar to those described in *Fasciola hepatica* and certain other digenetic trematodes. Their probable function is to increase the absorptive surface of the blind caeca rather than to aid the movement of materials. E.I.S.

- 1504—WRIGHT, K. A., 1962. "An electron microscope study of the somatic muscle cells of the parasitic nematode, *Capillaria hepatica*." [Abstract.] *Journal of Parasitology*, 48 (2, Sect. 2), 42.

The elongate contractile portion of the muscle cell was observed to contain central myofilaments and longitudinal ridges of dense material. Glycogen and lipid occur in the enlarged cell body which projects into the pseudocoelom. The nucleus is situated near the juncture of the contractile region and the cell body. Ribosomes and mitochondria are also present in the cytoplasm. M. B-B.

- 1505—WRIGHT, K. A., 1962. "Cytology of the intestinal cells of the nematode *Capillaria hepatica*." [Abstract.] *Journal of Parasitology*, 48 (2, Sect. 2), 47.

The structure of the intestinal cells of *Capillaria hepatica* was observed. The structure of the peripheral cytoplasm indicates active protein synthesis. The nucleus is central and this region also contains glycogen and lipid droplets. The Golgi zone, endoplasmic reticulum, basement membrane and bacillary layer are described. M.B-B.

- 3037—WRIGHT, K. A., 1963. "Cytology of the bacillary bands of the nematode *Capillaria hepatica* (Bancroft, 1893)." *Journal of Morphology*, 112 (3), 233-260.

Both gland cells and non-glandular cells occur in the hypodermal chords of *Capillaria hepatica*. Cytological study did not reveal any glandular activity in hypodermal gland cells but the development of the apical membrane forming a conspicuous lamellar apparatus suggests that this type of cell functions in osmotic or ionic regulation. The non-glandular cell contains much glycogen especially in the basal regions. In addition, the organelles occur mainly in the apical cytoplasm. These cells are probably storage cells and the localization of the organelles and the glycogen indicates polarization of metabolic activities. R.C.A.

- 1505—WRIGHT, K. A., 1963. "The cytology of the intestine of the parasitic nematode *Capillaria hepatica* (Bancroft, 1893)." *Journal of Ultrastructure Research*, 9 (1/2), 143-155.

A single cell type was distinguished in the intestinal epithelium of *Capillaria hepatica* by means of light and electron microscopy. An extensive endoplasmic reticulum occurs in the periphery of the cytoplasm, and glycogen in the central region. Golgi zones occur between the endoplasmic reticulum and glycogen. Microvilli bordering the luminal surface are covered by a fibrous extracellular material considered to be mucopolysaccharide or mucoprotein; this may have significance in the uptake of materials by the intestine. The microvillous nature of the bacillary layer of the intestine is noted; no adequate demonstration of cilia in the nematode intestine has yet been reported. The orientation of glycogen, endoplasmic reticulum and Golgi zones suggests that glycogen synthesis or deposition may occur through the Golgi zones. The extensive development of organelles within intestinal cells indicates that the intestine is capable of extensive synthetic activity, and uptake and transport of materials from the intestinal lumen to the pseudocoelom.

K.A.W.

- 2451—WU, L. Y., 1967. "Differences of spermatheca and sperm cells in the genera *Ditylenchus* Filipjev, 1936 and *Tylenchus* Bastian, 1865 (Tylenchidae: Nematoda)." *Can. J. Zool.*, 45 (1), 27-30.

Structural differences in the spermatheca and sperm cells of *Ditylenchus* and *Tylenchus* were found to be of great value in the separation of these 2 genera. In *Ditylenchus* the spermatheca is a long tubular structure located between the uterus and the oviduct. The sperm cell consists of 2 parts: a dense nucleus and a large translucent vesicle. In *Tylenchus* the spermatheca, when present, is in the form of a diverticulum of various shapes, arising at the junction of the uterus and the oviduct. The translucent vesicle is absent within the sperm cell.

[A.S.] D.W.L.

384—Japanese Journal of Medical Science and Biology.

- b. YANAGISAWA, T., 1957.—"On the spermatogenesis in *Ascaris suilla*, especially on its morphological observation." 10 (3/4), 247-255.

263—Japanese Journal of Medical Science and Biology.

- b. YANAGISAWA, T. & ISHII, K., 1954.—"On the granules in cytoplasm in relation to the formation of ascaris egg-shell." 7 (2), 215-229.

658—Cellule.

- a. YOSUFZAI, H. K., 1952.—"Cytological studies on the spermatogenesis of *Fasciola hepatica* L." 55 (1), 5-19.

(658a) Yosufzai describes the appearance of a central blastophore during spermatogenesis in *Fasciola hepatica*. The structure first appears at the end of the third spermatogonial division and occasionally a nucleus-like body can be seen at its centre. He describes the appearance and arrangement of the Golgi apparatus and mitochondria and is of the opinion that the spermatozoa are formed from both cytoplasm and nuclear material and consist of a head and a tail region. He discusses at length the work of other authors on trematode spermatogenesis. s.w.

192—Cellule.

- a. YOSUFZAI, H. K., 1953.—"Cytological studies on the oogenesis of *Fasciola hepatica* L." 55 (2), 165-176.

(192a) Yosufzai describes the extrusion of nuclear material into the cytoplasm of the oogonia in *Fasciola hepatica*. Nucleoli appear in very early oocytes and as the oocytes grow nucleolar material and even entire nucleoli pass out through the nuclear membrane and lie in the cytoplasm. Golgi elements and mitochondria are present in oogonia and oocytes. s.w.

192-Cellule

- b. YOSUFZAI, H. K., 1953.—"Fertilisation in *Fasciola hepatica* L." 55 (2), 177-184.

(192b) In *Fasciola hepatica* fertilization of the ovum takes place in the distal part of the uterus. Spermatozoa which penetrate the shell but fail to enter the oocyte frequently enter vitelline cells where they degenerate. Only the head and the middle piece of the spermatozoon enters the cytoplasm of the oocyte, the tail breaking off and remaining on the surface. The first maturation division takes place before the spermatozoon penetrates, the second afterwards. A second polar body is formed. A male pronucleus is formed and fusion of the two pronuclei takes place in the centre of the ovum. s.w.

- 3013—ZAJICEK, D., SWARTZ, F. J. & FLOYD, A. D., 1970. "*Ascaris suum* and *Toxocara canis*:" radioautographic detection of DNA in Feulgen-negative muscle nuclei." *Expl Parasit.*, 27 (3), 516-523.

Following the failure of cytochemical techniques to detect DNA in the Feulgen-negative somatic muscle nuclei of adult *Ascaris suum*, sections of juvenile and adult *A. suum* and *Toxocara canis* were exposed to tritiated actinomycin D and studied autoradiographically. DNA was detected by grain counts over labelled muscle nuclei by comparison with counts in control sections pretreated with DNase and RNase. Feulgen-positive muscle nuclei were found at the posterior tip of very small *Ascaris* juveniles but nuclei in the mid-body were negative and larger, resembling adult nuclei. Comparison of grain concentrations and volumes suggests that DNA increases as the nucleus enlarges, therefore Feulgen negativity in adult nuclei is not due only to DNA dilution but apparently to morphological differentiation also. A.J.

- 2578—ZEKAVET, S. Y.; KHAYAT, A. A. M., 1971. "*Echinococcus granulosus*. Isolation and partial characterization of sRNA and DNA." *Israel J. med. Sci.*, 7 (11), 1292-1294. [En] Dept. of Biochemistry, Medical School, Pahlavi University, Shiraz, Iran.

sRNA and DNA were isolated from protoscoleces obtained from hydatid cysts from sheep liver. Thermal denaturation curves and ratios of RNA phosphorus to DNA phosphorus indicated that the hydatid sRNA and DNA may be similar to those of the host and of other animals. D.A.Cz.

- 340—ŽITNÁŇ, R., 1971. [Nematoda, Acanthocephala and Hirudinea in fish in the River Hron (Czechoslovakia).] "Nematoda, Acanthocephala und Hirudinea bei Fischen im Flusse Hron (ČSSR)." *Studia Helminth.*, Year 1968, 2, 21-32. [English & Russian summaries pp. 31-32.]

Of 851 freshwater fish of 47 species, taken from the River Hron, Czechoslovakia, 115 were infected with nematodes (8 species), 290 with acanthocephalans (5 species) and 13 with leeches (2 species). The incidence, intensity of infection, localization in the body and geographical localities of each parasite are given. *Rhabdochona acuminata* is recorded for the first time from Czechoslovakia. *Metabronema truttae* and *Raphidascaris acus* were considered to be the most important parasites epizootologically. The ability of acanthocephalans to infect a wide range of hosts in many different habitats is emphasized. M.R.N.S.

Additional references

- 2339 BURTON, P. R. Some structural and cytochemical observations of the axial filament complex of lung-fluke spermatozoa. *Journal of Morphology* (1973) 140 (2) 185-196 [En] Dept. of Physiology and Cell Biology, Univ. of Kansas, Lawrence, Kansas, 66044, USA.

In transverse section, doublets of the axial unit of *Haematoloechus medioplexus* spermatozoa have walls made up of protofibrillar subunits 50 to 60 Å in diameter. The partition between A and B members of a doublet often show extra protofibrils which may partially occlude the "lumen" of the A tubule. Each A tubule has outer and inner lateral arms at 215 Å intervals; the outer is expanded at its free end and the inner often connects to the B tubule of the adjacent doublet. Regularly spaced radial links connect the central sheath of an inner core complex to the A tubules of the peripheral doublet elements. Tests for magnesium-activated ATPase activity provide evidence that the enzyme is associated with the surface of doublet elements and of the central sheath. Study of an axial element which developed abnormally suggests that normal differentiation of an axial unit may depend on the elaboration of a core complex and radial links. AJ

- 1643 HULÍNSKÁ, D. Studies on the morphology and histochemistry of the male gonad and spermatogenesis in *Enterobius vermicularis* (Leach, 1853). *Folia Parasitologica* (1973) 20 (4) 329-338 [En, ru, 4 pl. (unpaged)] Inst. of Parasitology, Czechoslovak Acad. of Sciences, Prague, Czechoslovakia.

The male reproductive system of *Enterobius vermicularis* consists of a testis, a seminal vesicle, a vas deferens and an ejaculatory duct, the latter forming the cloaca together with the rectum. In the vas deferens, 3 sections differing in histological structure and histochemical reactions of the various granular substances were distinguished. The granules of the proximal section were mostly proteinaceous, of the medial section lipoidal, of the distal section lipoproteinaceous; the last-named were pyroinophilic and gave a positive reaction for alkaline phosphatase. The testis contained oval spermatogonia, spherical spermatocytes with concentrically arranged basophilic granules, and spermatids with a basophilic rodlike formation. Scanning electron micrographs of the spicule surface disclosed verrucae and a groove in the ventral surface of the attenuated proximal spicule portion. The shape of the anal papillae was mammillate. [AS]. AJ

- 3739 KURASHVILI, B. E.; PKHAKADZE, G. M.; SHENGELIA, F. V. [Cytological study of *Ascaris lumbricoides* and *A. suum*.] *Genetika* (1965) No. 5, 170-175 [Ru, en]

A cytological investigation of human and pig ascarids revealed that in *Ascaris lumbricoides* the haploid number of chromosomes was 12, and the diploid 24. In *A. suum*, $n = 8$ and $2n = 16$. EG

- 3323 POLYKOVA-KR"STEVA, O. VASILEV, I. [The ultrastructure of the spermatozoan tail of *Raillietina carneostrobilata*.] *Izvestiya na Tsentralnata Khel'mintologichna Laboratoriya* (1973) 16, 153-160 [Bg, en, ru].

- 3317 QUENTIN, J. C.; POINAR, G. O., JR. Comparative study of the larval development of some heteroxenous subulurid and spirurid nematodes. *International Journal for Parasitology* (1973) 3 (6) 809-827 [En] Laboratoire de Zoologie (Vers), Muséum National d'Histoire Naturelle, 75 Paris 5^{ème}, France.

A comparative developmental study of the first-stage larvae of *Allodapa suctorica*, *Seuratium cadarachense*, *Rictularia proni*, *Physaloptera retusa*; *P. turgida*, *Spirura guianensis* and *Acuaria anthuris* (representing the Subuluridae, Seuratidae, Rictulariidae, Physalopteridae, Spiruridae and Acuariidae) is reported. The early larval morphology of each is described and illustrated. It was found that the general organization and mode of development are comparable to first-stage viviparous filarial nematodes and that the development of each species is unique and characterized principally by the number and growth of the intestinal initials, the number and rate of multiplication of the mesenchymal cells, and the position and nature of the rectal cells in relation to the R_1 mesenchymal initial. In the primitive forms, the number of tissue initials in the newly hatched larvae is relatively high, but the development is much slower than in the evolved groups, which hatch with a reduced number of initials. Thus, as the larvae become more precocious, they show an accelerated development in the intermediate host. MRNS

- 1839 ZAFFAGNINI, F. Parthenogenesis in the parasitic and free-living forms of *Strongyloides papillosus* (Nematoda, Rhabdiasoidea). *Chromosoma* (1973) 40, 443-450 [En] Zoological Inst., Univ. of Bologna, Italy.

Both parasitic and free-living females of a calf strain of *Strongyloides papillosus* are parthenogenetic and have the same chromosome number ($2n = 4$). The oocytes of parasitic females undergo only one homeotypic maturation division without homologous chromosome pairing, i.e. mitotic parthenogenesis. The oocytes of free-living females show normal pairing and disjunction of homologous chromosomes but only one diploid polar body is expelled, i.e. meiotic parthenogenesis. The diploid chromosome number is regained by separation of the 2 sister chromatids of each univalent during or after anaphase I. JWS

1911. October 1. The first of the series of lectures on the history of the United States was given by Mr. J. H. Pelt. The lecture was on the subject of the discovery of the continent.

The lecture was given in the evening at the University of California. The lecture was on the subject of the discovery of the continent. The lecture was given in the evening at the University of California. The lecture was on the subject of the discovery of the continent.

1911. November 1. The second of the series of lectures on the history of the United States was given by Mr. J. H. Pelt. The lecture was on the subject of the discovery of the continent.

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1911. December 1. The third of the series of lectures on the history of the United States was given by Mr. J. H. Pelt. The lecture was on the subject of the discovery of the continent.

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1911. January 1. The fourth of the series of lectures on the history of the United States was given by Mr. J. H. Pelt. The lecture was on the subject of the discovery of the continent.

The lecture was given in the evening at the University of California. The lecture was on the subject of the discovery of the continent. The lecture was given in the evening at the University of California. The lecture was on the subject of the discovery of the continent.

1911. February 1. The fifth of the series of lectures on the history of the United States was given by Mr. J. H. Pelt. The lecture was on the subject of the discovery of the continent.

ANNOTATED BIBLIOGRAPHIES	Period covered	Number of References	Price	
			\$	£
1. <u>Cysticercus ovis</u> and <u>Taenia ovis</u>	1932-69	59	1.30	0.50
2. <u>Taenia saginata</u> and <u>T. solium</u> in Lebanon, Turkey and Yugoslavia	1932-69	50	1.30	0.50
3. Helminthology in Iraq	1932-69	71	1.80	0.70
4. Humpsore (Stephanofilariasis) in domestic animals	1932-69	71	1.80	0.70
5. Skin lesions in domestic animals caused by <u>Elaeophora</u> , <u>Rhabditis</u> & <u>Parafilaria</u>	1932-69	55	1.30	0.50
6. Helminths and plant nematodes of Morocco	1932-70	111	2.60	1.00
7. <u>Angiostrongylus</u>	1932-71	210	7.00	2.70
8. Factors influencing the development of <u>Ascaris</u> eggs	1932-71	120	3.10	1.20
9. Helminths in archaeological and pre-historic deposits	1910-72	32	1.30	0.50
10. Neurological involvement in <u>Trichinella spiralis</u> infection in man	1932-70	51	1.60	0.60
11. White tip disease (<u>Aphelenchoides besseyi</u>) of rice in Africa and the tropics	1913-72	150	6.20	2.40
12. Helminths in dogs in Japan	1960-72	89	2.60	1.00
13. Nematodes on soybean (<u>Glycine max</u>)	1932-72	184	5.70	2.20
14. <u>Oswaldocruzia</u> (Nematoda)	1930-73	29	1.30	0.50
15. Transmission of plant viruses by nematodes	1930-73	120	3.10	1.20
16. Plant nematology in Venezuela	1932-72	21	1.30	0.50
17. <u>Diorchis</u>	1931-72	46	3.10	1.20
18. <u>Nacobbus</u> (Nematoda: Tylenchida)	1930-73	19	1.30	0.50
19. Plant Nematodes of the Caribbean	1932-73	229	7.13	2.75
20. <u>Dicrocoelium hospes</u>	1964-74	11	1.30	0.50

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